

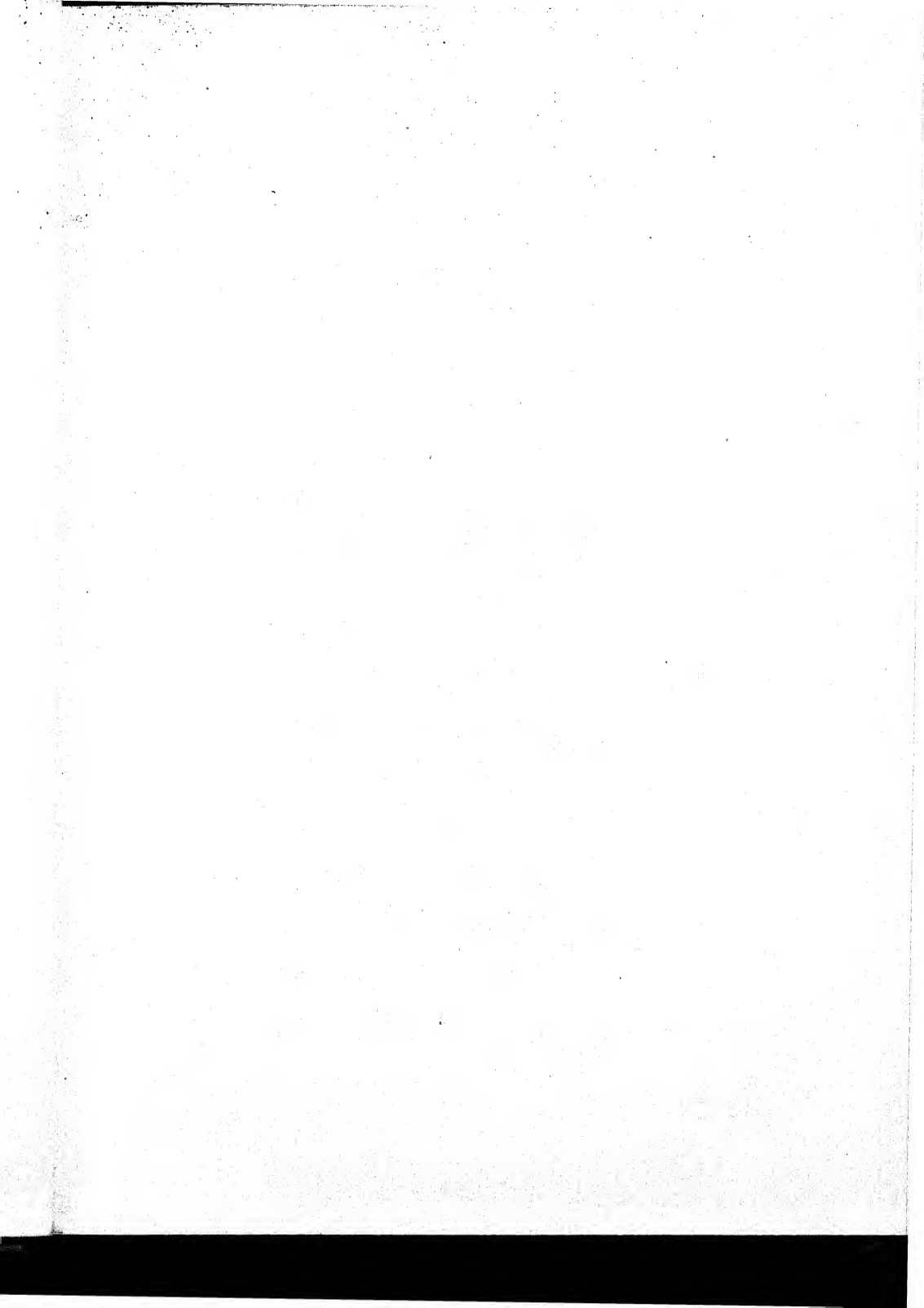
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THE
COMPACT ENCYCLOPEDIA
VOLUME II

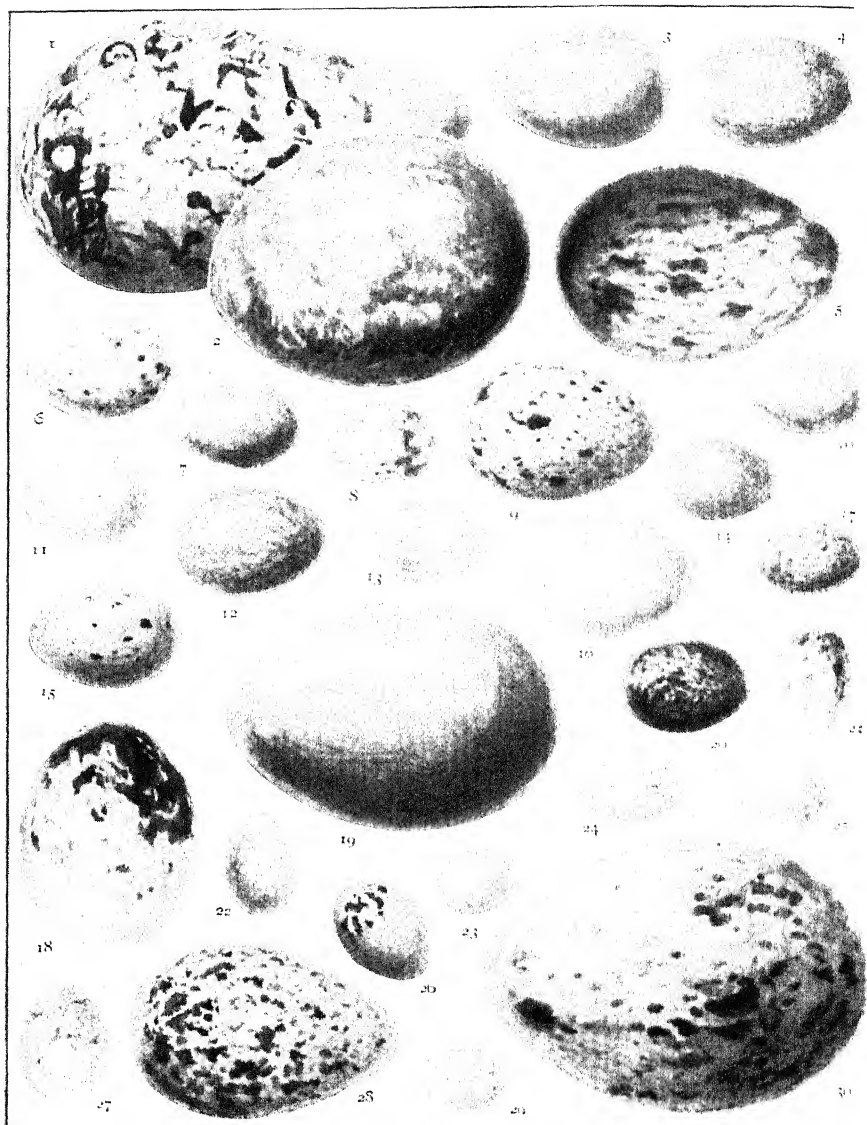
EDITORS

RICHARD F. PATTERSON, M.A.(Cantab.), D.Litt.(Glasgow),
F.S.A.Scot.; formerly Charles Oldham Shakespeare Scholar,
Cambridge University.

JOHN DOUGALL, M.A., D.Sc., F.R.S.E.; Gold Medallist of
the Royal Society of Edinburgh.



EGGS OF BRITISH BIRDS



1. Guillemot. 2. Peregrine Falcon. 3. Starling. 4. Redwing. 5. Raven. 6. Mistle-thrush.
 7. Nightingale. 8. Swallow. 9. Jackdaw. 10. Stonechat. 11. Kingfisher. 12. Blackbird. 13. Robin.
 14. Hedge Sparrow. 15. Song Thrush. 16. Green Woodpecker. 17. Meadow Pipit. 18. Sparrow Hawk.
 19. Heron. 20. Skylark. 21. Nuthatch. 22. Grey Wagtail. 23. Gold Crested Wren. 24. Wren.
 25. Blue Tit. 26. Bullfinch. 27. Yellow Bunting. 28. Lapwing. 29. Long-tailed Tit. 30. Herring Gull.

THE COMPACT ENCYCLOPEDIA

VOLUME II

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THE COMPACT ENCYCLOPEDIA

VOLUME II

Candlemas, a Church feast, instituted, according to Baronius, by Pope Gelasius I (492-496), in commemoration of the presentation of Christ in the temple and of the purification of Mary. It falls on 2nd Feb., and on this day among Roman Catholics lighted candles are carried about in procession, and all candles and tapers which are to be used in the churches during the entire year are consecrated.

Candle-nut, the nut of *Aleurites triloba*, a tree of the Pacific Islands, &c., nat. ord. Euphorbiaceæ. It yields an oil used for food and for lamps, while the oily kernels are also strung together and lighted as torches.

Candle Standard, the unit of luminous intensity; we speak, e.g., of a 32-candle-power glow-lamp. The standard lamps now in use are: in Britain, the pentane lamp, which is 10 c.p.; in France, the Carcel lamp, which burns colza oil and has an intensity of 9·62 c.p.; and in Germany, the Hefner lamp, which burns amyl acetate and has a power of about 0·9 candle. An incandescent electric lamp gives about 0·8 candle-power per watt.

Candlish, Robert Smith (1807-1873), Scottish divine. He became, next to Chalmers, the most prominent leader of the 'non-intrusion' party and disruptionists of 1843. From the death of Chalmers till his own death, Candlish was the ruling spirit in the Free Church. In 1862 he was made principal of the New College, Edinburgh. He was the author of *Reason and Revelation* and *The Two Great Commandments* (1860).

VOL. II.

Candy, a city near the centre of Ceylon, 72 miles north-east of Colombo (with which it is connected by railway), in a fertile valley surrounded by finely-wooded hills. The residence of the Governor at the north-east extremity is among the finest structures in Ceylon. Pop. 29,451.

Candytuft, the popular name of several flowers of the genus *İbëris*, order Cruciferae, common in gardens: said to be named from Candia.

Canea, chief commercial town of Crete, the principal mart for the commerce of the island in wax, soap, oil, silk, fruit, wool, and provisions. Pop. (1928), 26,604; the pop. of the province is (1928) 111,513.

Canicatti, a town in Sicily, with a population of 25,000, mostly engaged in agriculture.

Canker, in botany, a diseased condition of trees, caused by parasitic fungi, in which the bark and cambium are gradually destroyed, so that a continually enlarging, gaping wound results. The most important canker-fungi are *Dasy-scypha Willkommii* (larch canker) and *Nectria ditissima* (canker of apple, ash, and many other trees).

Cannanore, a seaport, India, chief British military station in Malabar. Pop. 30,000.

Cannel Coal, a dull black coal which breaks with a conchoidal fracture. It is easily cut, takes a high polish, and burns with a large white flame. The average composition is: carbon, 66 to 84 per cent; hydrogen, 5·5 to 9 per cent; oxygen and nitrogen, 5 to 10·5 per cent; ash, 2 to 6

per cent. The calorific value is from 13,000 to 14,000 B.Th.U.'s, and it usually gives about 11,000 cu. feet of gas per ton. There are several British varieties of cannel, e.g. splint coal, parrot, the once famous Lesmahagow gas-coal, and torbanite.

Cannes, a seaport of France, on the shore of the Mediterranean, département of Alpes-Maritimes; famous as a winter-resort. Pop. (1926), 36,800.

Cannibalism, or **Anthropophagy**, the eating of human flesh as food. The word is derived from Caniba, a variant of Carib, a West Indian tribe among whom the Spanish discoverers first noticed the custom. The custom was almost a religious ceremonial, having its origin in the belief that the qualities of the person eaten might be acquired by the eater.

Canning, Charles John, Earl (1812–1862), English statesman, son of George Canning. In 1841 he was appointed Under-Secretary of State for Foreign Affairs, and in 1846 Commissioner of Woods and Forests. In the Aberdeen ministry of 1853, and under Palmerston in 1855, he held the postmaster-generalship, and in 1856 went out to India as Governor-General. Throughout the Mutiny he showed a fine coolness and clear-headedness. He was made Viceroy, but returned to England with shattered health in 1862, dying in the same year.

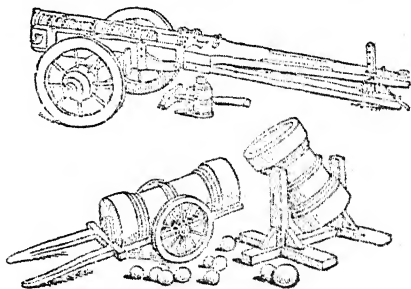
Canning, George (1770–1827), British statesman. He was first brought into Parliament by Pitt in 1793, and in 1796 became Under-Secretary of State. In 1797 he projected, with some friends, the *Anti-Jacobin*, to which he contributed the *Needy Knife-grinder* and other poems and articles. In 1807 he was appointed Secretary of State for Foreign Affairs. In 1814 he was appointed minister to Portugal, and remained abroad about two years. In 1822 the death of Castlereagh called him to the Cabinet as Foreign Secretary. On 12th April, 1827, his appointment to be Prime Minister was announced, but his administration was terminated by his death on the 8th of August following. On all the leading political questions of his day, with two exceptions—the emancipation of the Catholics and the recognition of the South American republics—he took the high Tory side.—**BIBLIOGRAPHY:** R. Bell, *Life of Canning*; A. G. Stapleton, *Canning and*

His Times; Sir J. A. R. Marriot, *George Canning and His Times*; W. Alison Phillips, *George Canning*.

Cannock, a town of England, in Staffordshire, 7½ miles N.W. of Walsall, with coal-mines, &c. Pop. (1931), 34,588. Near it is Cannock Chase, a tract of 3600 acres.

Cannon, a big gun or piece of ordnance. Cannon were at first made of wood, well secured by iron hoops, or sometimes of leather. The earliest shape was somewhat conical, with wide muzzles, and afterwards cylindrical. They were then made of iron bars firmly bound together with iron hoops like casks, 'Mons Meg' at Edinburgh Castle being a good example. Cast-iron ordnance was first made in England at Buckstead, in Sussex, by Hoge and Baude in 1543.

Modern weapons may be divided into three main classes, viz. guns, howitzers, and trench-mortars. Guns have a flat trajectory and a high muzzle-velocity,



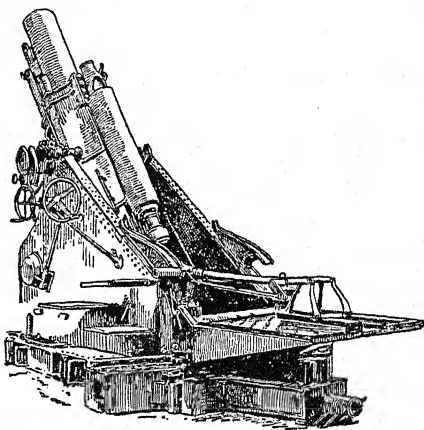
Cannon of the Fifteenth Century

and are comparatively long and heavy weapons. Howitzers have a high trajectory and a low muzzle-velocity, and the piece is shorter and lighter than a gun of corresponding calibre. Trench-mortars are generally smooth-bore muzzle-loading pieces, firing a heavy bomb at high angles for short ranges; they are very effective against earthworks and fortifications, owing to their steep angle of descent and great shell-power. Great improvements and changes in the manufacture of cannon have been introduced in recent years. The introduction of rifling, in 1859, enabled an elongated projectile (called the *shell*) to be used. The increased weight of these projectiles, their rapid rotation, and the increased

rate of fire due to the introduction of breech-loading, try the piece so severely that iron, brass, and gun-metal are now entirely superseded in modern weapons by steel low in carbon. Field-guns and most howitzers are generally made in two or more layers, each layer shrunk on to the one inside it. Heavier guns are made by winding steel ribbons, $\frac{1}{16}$ inch thick and $\frac{1}{4}$ inch wide, round and round the inner tube with gradually decreasing tension, so as to get an equal resistance throughout. A jacket or outer tube is then shrunk on over the wire. Wire-wound guns are much lighter for the same strength than built-up guns. When corroded or worn out from frequent firing, the inner tube of a piece made by either method can be removed and replaced by a new one. Various Governments have gun-factories of their own, such as the British factory at Woolwich; but there are also some famous private firms that turn out ordnance according to order, such as the Armstrong-Whitworth firm (Elswick), the Coventry Ordnance Works, the Schneider-Canet firm at Creusot (France), and until lately the firm of Krupp at Essen.

All modern guns and howitzers are breech-loading. The breech is closed either by a swinging block with an interrupted screw (e.g. British field-gun), or by a wedge of slight taper which slides in a slot across the breech (e.g. German field-gun and British field-howitzer), or else by an eccentric screw (e.g. French field-gun). The interrupted-screw system is used in most British guns. In it the screw surface of the breech-block is broken by four to six strips, while there are corresponding screwed and smooth strips in the interior of the bore at the breech. By placing the screwed relief portions of the one opposite the smooth sunk portions of the other, the breech-screw is locked in the gun by an eighth or a twelfth of a turn. Till the breech-block is locked fully home, and the lock placed in the firing position—which is done automatically—the gun cannot be fired. All modern breech actions have safety devices which prevent the gun from being fired till the breech is closed and locked. In a gun-carriage or gun-mounting, provision has to be made for checking the recoil, for running up the gun to firing-position after recoil, elevating it, and traversing laterally. These were formerly

provided for by simple means, but somewhat complicated arrangements have now been introduced, especially as regards the recoil, which the use of a high charge has greatly increased, and which requires to be speedily dealt with in quick-firing arrangements. The principle of the hydraulic buffer is now commonly employed to deal with the recoil, the gun being connected with a piston which slides in a metal cylinder filled with liquid, mineral oil, compressed air, &c., and fixed to the carriage. The energy of recoil is absorbed by forcing the liquid through holes in the piston-head or partly



Howitzer

B.L. 9.2-inch howitzer in firing position

by the compression of air. The piece itself has longitudinal projections fitting in featherways cut in a top carriage or 'cradle'. It can freely recoil in the cradle, to which the cylinder of the buffer is fixed. After recoil the piece is run up to the firing-position by strong springs or compressed air, which have been compressed by the action of recoil. In guns and howitzers not on fixed mountings the carriage is anchored by brakes and a so-called 'spade' on the end of the trail. The heavy guns of modern battleships require a powerful system of hydraulic or electric appliances to work them.

In nearly all gun-equipments, elevation is usually given by an elevating-screw under the breech end of the cradle. Howit-

zers usually have a tooth-arc attached to the cradle, gearing into a pinion on the carriage. The means of traversing are usually very simple. In our own equipment it consists of an endless screw, gearing into a toothed arc at the rear of the upper carriage. In German field-guns a screw on the traversing-bed engages with a nut at the rear end of the cradle. All French guns are traversed on the axle-tree.

The first sight used was a tangent-sight. This was later superseded by an arc-sight working on the same principle. Modern weapons in the field now carry in addition a dial-sight, which enables them to be layed from behind cover. This consists of a short telescope bent at right angles and surmounted by a movable head. The head is fixed on a horizontal graduated table, and is capable of being turned in any direction. The projectiles for rifled guns, as already stated, are elongated, their length being three or four times their diameter. See *Shells*.

Cannstadt, an old town in Württemberg, on the Neckar, 2 miles north-east of Stuttgart and incorporated with it in 1905. It has manufactures of woollens, cottons, steel, machines, &c., and extensive dyeworks.

Canoe, a light boat, narrow in the beam, and adapted to be propelled by paddles, often in conjunction with sails. They are of the most diverse materials and construction. Canoes are often hollowed out of a single log. The Indian canoes of Canada are of bark on a wooden frame. The Eskimo *kaiaks* consist of a light wooden frame covered with seal-skins sewed together with sinews, and having only one opening to admit the boatman to his seat. In England all canoeing affairs are under the control of the Royal Canoe Club, which holds annual paddling and sailing competitions.

Canon. See *Apocrypha*.

Canon, a Church dignitary who possesses a prebend, or revenue allotted for the performance of divine service in a cathedral or collegiate church. In England, besides the ordinary canons—who with the dean form the *chapter*—there are honorary canons and minor canons; the latter assist in the daily choral service of the cathedral.

Canonization, a ceremony in the Roman Church. It usually takes place

some years after beatification (q.v.). A day is dedicated to the new saint, his name is inserted in the calendar of the saints, a solemn mass is celebrated by the Pope, and the saint's remains are preserved as holy relics.

Canon Law, a collection of ecclesiastical constitutions for the regulation of the Church of Rome, consisting for the most part of ordinances of general and provincial councils, decrees promulgated by the Popes with the sanction of the cardinals, and decretal epistles and bulls of the Popes. There is also a canon law for the regulation of the Church of England, which under certain restrictions is used in ecclesiastical courts and in the courts of the two universities. In the Roman Church these collections came into use in the fifth and sixth centuries. The chief basis of them was a translation of the decrees of the four first general councils, to which other decrees of particular synods and decretals of the Popes were added. After the tenth century systematical compendiums of ecclesiastical law began to be drawn from these canons, the most important being that of the Benedictine Gratian of Chiusi, finished in 1151. New decrees of councils and new decretals were collected by Raymond of Pennafort under the name of *Decretales Gregorii Noni* (1234); and the later decretals, &c., were published in 1298.

Canopus, an ancient Egyptian city, between Alexandria and the western mouth of the Nile, once the chief harbour of the Delta. It had a popular temple of Serapis.—In Egyptian mythology, a water-god, whose worship was superseded under the first Ptolemy by that of Serapis.

Canosa, a city of South Italy, famous for the rock-cut tombs in its vicinity, from which many rare antiquities have been obtained. Pop. 26,053.

Canova, Antonio (1757–1822), Italian sculptor. In 1782 he produced his *Theseus and the Slain Minotaur*, which marked a new era in modern sculpture. He established a school for the benefit of young Venetians, and amongst other works produced his group of *Venus and Adonis*, a *Psyche and Butterfly*, the well-known *Hebe*, *The Pugilists*, and the group of *Cupid and Psyche* (in the Louvre). He afterwards executed in Rome his *Perseus*

with the Head of Medusa. In 1802 he was invited by Bonaparte to Paris to make the model of his colossal statue. Among the later works of the artist are a colossal *Washington*, a *Venus rising from the Bath*, the *Graces rising from the Bath*, a *Dancing Girl*, a colossal *Hector*, and a *Paris*.—Cf. A. G. Meyer, *Canova*.

Canrobert, François Certain (1809–1895), French marshal. He commanded the French army for a time in the Crimean War. In the Italian War (1859) he distinguished himself at Magenta. In the Franco-Prussian War he belonged to the force that was shut up in Metz and had to capitulate.

Canso, Strait of, a narrow strait separating Nova Scotia from Cape Breton Island.

Cantal, a central department in France; area, 2229 sq. miles; capital, Aurillac. The greater part of it, occupied by the Cantal Mountains and high lands, furnishes only timber, archil, and pasture. It is watered by numerous rivers, the principal of which are the Dordogne, Cère, and Lot. The principal crops are rye, buckwheat, potatoes, and chestnuts, hemp, and flax. Large quantities of cheese ('Auvergne cheese') are made. Hot mineral springs are abundant. Pop. (1926), 196,999.

Canterbury, county of a city of England, in Kent, giving name to an archiepiscopal see, the occupant of which is Primate of all England. The foundation of the see took place soon after the arrival of St. Augustine in 596. The town is beautifully situated in a fertile vale, on the River Stour. The cathedral, one of the finest ecclesiastical structures in England, 530 feet in length and 154 feet in breadth, has been built in different ages, the oldest part dating from about 1174. The great tower, 235 feet in height, is a splendid specimen of the Pointed style. Other ecclesiastical buildings are St. Augustine's monastery, and the church dedicated to St. Martin, believed to be one of the oldest existing Christian churches. The old archiepiscopal palace is now represented by a mere fragment, and the archbishops have long resided at Lambeth. There are breweries and malting establishments; and the principal articles of trade are corn and hops. There are barracks for cavalry and infantry. Pop. (1931), 24,450.—BIBLIO-

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Canterbury, a district occupying most of the centre of South Island, New Zealand, with a coast-line of 200 miles and a greatest breadth of about 150 miles. The western part is traversed by mountains, from which a fertile plain of 2,500,000 acres slopes gradually down to the sea. Banks' Peninsula is a projection on the east coast, consisting of an assemblage of densely-wooded hills, and containing several harbours. The famous 'Canterbury Plains', extending along the coast, are admirably adapted for agriculture, while the interior is fine pastoral country. Its considerable mineral resources are as yet not well developed, though some coal is raised. The chief places in the province are Christchurch, the capital, and Lyttelton, the port town, 8 miles from Christchurch. Area, 13,858 sq. miles; pop. (1926), 213,746.

Canterbury-bell, a name given to species of *Campanula*, *C. medium* and *C. trachelium*. In varieties the colour may be white, rose, or pure blue. See *Campanula*.

Cantharides, or Spanish Fly, a kind of beetle common in Spain, Italy, and France, 6 to 10 lines long, and of a golden-green colour. When bruised, these insects are extensively used as the active element in vesicatory or blistering plasters. Their active property they owe to *cantharidin*, a powerful poison, and they should be used with the utmost caution.

Canton, a city and former capital of Southern China, 80 miles from the sea, on the Pearl River. The city proper was till 1919 enclosed by walls 25 feet high and 20 feet thick, forming a circuit of 6 miles, with twelve gates. The foreign mercantile houses, and the British, French and American consulates, have as their special quarter an area in the south-west. The river opposite the city for the space of 4 or 5 miles is crowded with boats, a large number of which are fixed residences, containing a population of 200,000. The industries of Canton are varied and important, embracing silk, cotton, porcelain, glass, paper, sugar, lacquered ware, ivory-carving, metal goods, &c. The Portuguese and the Dutch traded with Canton in the sixteenth century, but were soon superseded by

the British, who established a factory there in 1684. Canton remained the chief foreign emporium in China until 1850, when Shanghai began to surpass and other ports to compete with it. There are now water-works and a supply of electric light and power. River steamers ply daily between Canton, Hong Kong, and Macao. In 1927 Wuhan became capital of Southern China, in place of Canton. Pop. c. 900,000. See *China*.

Canton, a town of the U.S.A., in Ohio. It has large steel and bridge works, and exports coal, cereals, and limestone. Pop. 99,248.

Canute, or **Cnut** (c. 994–1035), King of England and Denmark. He succeeded his father, Swegen or Sweyn, on his death in England in A.D. 1014. After the assassination of Edmund Ironside he was accepted king of the whole of England (1017). At Harold's death in 1018 he gained Denmark; in 1028 he conquered Norway; and in 1031 he made an invasion of Scotland. Sweden also was vassal to him. He died at Shaftesbury, leaving Norway to his eldest son, Sweyn; to the second, Harold, England; to the third, Hardicanute, Denmark.

Canvas-back Duck, a bird peculiar to North America, and considered the finest of the water-fowl for the table. The plumage is black, white, chestnut-brown, and slate colour; length about 20 inches.

Caoutchouc. See *Rubber*.

Cape Breton, an island of the Dominion of Canada, separated from Nova Scotia, to which province it belongs, by the narrow Strait of Canso; area, 3120 sq. miles. It is of very irregular shape, the Bras d'Or, an almost landlocked arm of the sea, penetrating its interior in various directions, and dividing it into two peninsulas connected by an isthmus across which a canal has been cut. The surface is rather rugged, and only small portions are suited for agriculture; but it possesses much timber, valuable minerals, and the coast abounds in fish. Timber, fish, and coal are exported. The chief town is Sydney. There is a wireless station near Glace Bay. Pop. of Cape Breton, 83,240.

Cape Coast Castle, a town with a fort in the Gold Coast, West Africa. The fortress stands on a rock close to the sea. Steamers regularly call here; the exports are gold-dust, ivory, and palm-oil. Pop. 15,000.

Cape Cod, a large peninsula of the U.S.A., on the south side of Massachusetts Bay, 65 miles long and from 1 to 20 miles broad. It is mostly sandy and barren, but populous.

Cape Colony. See *Cape Province*.

Capefigue, Baptiste Honoré Raymond (1802–1872), French historian and biographer. His numerous works cover the whole field of French history from the time of Hugh Capet to that of the Empire. His best work is perhaps *Histoire de la réforme, de la ligue, et du règne de Henri IV*.

Cape Hatteras. See *Carolina, North*.

Cape Haytien, a town on the north coast of Haiti. It has an excellent harbour, but has declined in importance since the last century. Pop. about 20,000.

Cape Horn, the most southerly point of South America. It is a dark, precipitous headland, 500 to 600 feet high, running far into the sea. Navigation round it is dangerous on account of frequent tempests.

Capell, Edward (1713–1781), English Shakespearean scholar. His edition of Shakespeare was published in 1768, and his *Notes and Various Readings to Shakespeare* in 1783. His work is unattractively presented (Dr. Johnson said of him, "he doth gabble monstrously"), but is very sound and scholarly.

Capella, Martianus Minneus Felix, a Latin writer of the fourth century, whose work, the *Satiricon*, was in high repute in the Middle Ages as an encyclopedia of the liberal culture of the time.

Cape of Good Hope, a celebrated promontory near the southern extremity of Africa, at the termination of a small peninsula extending south from Table Mountain which overlooks Cape Town. This peninsula forms the west side of False Bay, and on its inner coast is Simon's Bay and Simon's Town, where there is a safe anchorage and a British naval station. Bartholomew Diaz, who discovered the Cape in 1487, called it Cape of Storms; but John II of Portugal changed this to its present designation. It was first doubled by Vasco da Gama in 1497.

Cape Province, the most southern province of the Union of South Africa, being one of the four original provinces, and formerly known as Cape Colony. It is bounded by Bechuanaland Protectorate, the Orange Free State, Basutoland, and

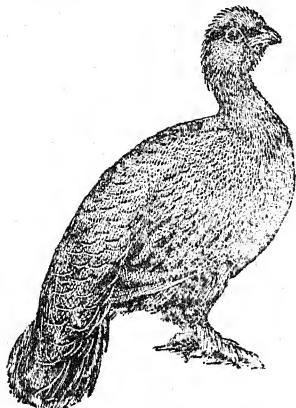
Natal on the north, the Indian Ocean on the east and south, and the Atlantic on the west. Area, 276,966 sq. miles; pop. 2,782,719, of whom 650,609 are European (706,137 by European census, 1926). It consists of the colony proper, Bechuanaland, East Griqualand, Tembuland, Pondoland, Transkei, and Walvis Bay. The coast is not much indented; the principal bays are St. Helena, Saldanha, Table, False, Walker, Mossel, and Algoa. A great part of the interior is arid. Several ranges of mountains, running nearly parallel to the southern coast, divide the country into successive terraces, rising as they recede inland, between which lie vast barren-looking plains, one of them, the Great Karoo, being 300 miles long and 100 miles broad. These plains make valuable sheep-walks, and the soil, where there is a sufficiency of water, is generally fertile. Irrigation, however, is greatly required, and large reservoirs are now being constructed. The principal and farthest inland mountain terrace, averaging 6000 or 7000 feet in height, commences in Namaqualand and runs to the north-east frontier. The culminating point is the Compass Berg, over 8000 feet. The Table Mountain at Cape Town rises almost perpendicularly about 3585 feet in height. The province is deficient in navigable rivers, and many of the streams are dry or almost so in the warm weather. The Orange is the largest. The climate is very healthy and generally pleasant. Except along the coast, where there are extensive forests, timber is scarce, but with irrigation trees can be grown anywhere. The principal minerals are copper ore, coal, iron ore, manganese, and diamonds, amethysts, agates, &c. Coal and copper are worked, and the diamonds have brought a great amount of money into the colony. Wheat, maize, and other cereals can be grown almost everywhere, if there is sufficient moisture. All kinds of European vegetables, pot-herbs, and fruits thrive excellently, and fruits, dried and preserved, are exported. The vine is cultivated, and excellent wines are made. Sheep-rearing, especially that of pure merinoes, is the most important industry, and wool the chief export. Ostrich feathers, hides, and skins are also exported. Angora goats are bred, and the export of mohair is important. Cattle-breeding is carried on. Manufactures are mainly for local use. Tobacco manu-

facture is increasing. In May, 1910, the Government lines were merged into one system, the South African Railways, and the total open mileage of this system in the Cape Province is 4254 miles. British money, weights, and measures are alone in use, except that the general land measure is the Dutch *morgen* = 2.116 acres. Diamonds and gold figure largely in the exports, the latter chiefly from the Transvaal. Wool, goats' hair, and ostrich feathers are valuable exports. The total value of diamonds produced till 1928 was £206,766,739. In spite of the number of British settlers, the majority of the European inhabitants are probably of Dutch origin. The coloured people are chiefly Hottentots, Kaffirs, Basutos, Griquas, Malays, and a mixed race. Education is compulsory for children of European extraction, and is supported by grants from the general revenue. For the higher education there are five colleges, besides the three Universities of Cape Town, Stellenbosch, and South Africa. The Dutch first colonized the Cape in 1652, and till the end of the eighteenth century the colony was under the Dutch East India Company. It was held by the British from 1795 to 1801, and it came finally into British possession in 1806. On the 31st May, 1910, the colony was merged into the Union of South Africa, forming an original province of the Union, being known officially as the province of the Cape of Good Hope. As such it is under an Administrator and a Provincial Council of 51, elected for three years. Cape Town, the capital of the province, is the seat of the Provincial Administration; and other important towns are Port Elizabeth, East London, Graham's Town, Kimberley, and Paarl. See *South Africa, Union of*.—BIBLIOGRAPHY: Sir H. H. Johnston, *History of the Colonisation of Africa by Alien Races*; A. S. and G. G. Brown, *The South and East African Year Book and Guide*; S. Playne, *Cape Colony: its History, Commerce, Industries, and Resources*; G. M. Theal, *History of South Africa*.

Caper, the unopened flower-bud of a low trailing shrub which grows in the countries bordering the Mediterranean. It is prepared as a pickle. Caper-sauce has been the accompaniment of boiled mutton since the time of Shakespeare at least.

Capercaillie, *Capercaillie*, or **Cock of the Wood**, the wood-grouse (*Tetrō uro-*

gallus), the largest of the gallinaceous birds of Europe, weighing from 9 to 12 lb. It inhabits pine-forests in various parts of Europe. It was once indigenous to Great



Capercaillie (*Tetrao urogallus*)

Britain and Ireland, but became extinct in the latter half of the eighteenth century, and was reintroduced successfully in Scotland in 1838.

Cape St. Vincent, the south-west point of Portugal.

Capet, the name of the French race of kings which has given 118 sovereigns to Europe. The first of the Capets known in history was Robert the Strong (*d.* 866). His descendant, Hugh, was in 987 elected King of France in place of the Carolingians. On the failure of the direct line at the death of Charles IV, the French throne was kept in the family by the accession of the indirect line of Valois, and in 1589 by that of Bourbon. See *France (History)*.

Cape Town, capital of the Cape Province, Union of South Africa, at the head of Table Bay and at the base of Table Mountain, 30 miles from the Cape of Good Hope. It is the seat of legislature of the South African Union. It is a well-planned town, and has numerous public buildings and institutions. The University of Cape Town (created 1918) has eighty teachers and about 1000 students. The port has a breakwater 3640 feet long, two docks (water, area 75½ acres) accommodating liners drawing up to 35 feet, a large graving-dock, and all repair, cargo, and bunkering facilities. The chief exports are

wool, wine, hides, fruit, gold, diamonds, &c. Besides the railway going inland, a railway connects the town with Simon's Town on False Bay. Pop. 205,866 (white, 112,059); white pop. by 1926 census, 130,568.

Cape Verde, the extreme west point of Africa, between Senegal and Gambia.

Cape Verde Islands, a group of fourteen volcanic islands and rocks in the Atlantic, 320 miles west of Cape Verde (see above), belonging to Portugal. They are, in general, hilly, but water is very scarce. They produce rice, maize, coffee, tobacco, the sugar-cane, physic-nuts, and various fruits. Coffee, hides, archil, physic-nuts, &c., are exported. Most of the inhabitants are negroes or of mixed race. The chief town is Praia, a seaport on São Thiago (Santiago), the largest island. Porto Grande, on São Vicente, is a coaling-station for steamers. Pop. (1926) 131,147.

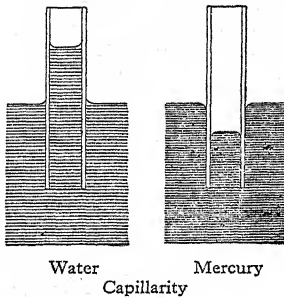
Cape Wrath, the north-west extremity of Scotland, county Sutherland. It is a pyramid of gneiss bearing a lighthouse, the light of which is 400 feet above sea-level.

Capgrave, John (1393-1464), English historian. His most important work was his *Chronicle of England from the Creation to A.D. 1417*. Other works were a *Liber de Illustribus Henricis* and a *Life of St. Katherine* (in English verse).

Capias, in English law, a writ of two sorts: one before judgment, called a *capias ad respondendum*, to take the defendant and make him answer to the plaintiff; the other, which issues after judgment, of divers kinds; as, a *capias ad satisfaciendum*, or writ of execution.

Capillarity, the general name applied to certain phenomena exhibited by the surfaces of liquids, because of the rise of liquids in narrow or capillary tubes. The surface film of a liquid behaves as if it were stretched equally in all directions. This is exemplified by the soap-bubble. Also, a small drop of mercury on a table, or a drop of water which falls on a dry, dusty road, assumes a spherical shape for the same reason. There is a notable difference in the behaviour of liquids in contact with solids, according as they do or do not wet the solid. Thus, if an open glass tube of small bore be inserted in water, it will be noted that the liquid rises within it; but in the case of a fluid like mercury, which does not wet the glass, the converse phenomenon appears, the liquid being

depressed in the tube below its former level. The part which capillarity plays among natural phenomena is a very varied one. By it the fluids circulate in the



porous tissues of animal bodies; the sap rises in plants, and moisture is absorbed from the air and soil by the foliage and roots. For the same reason a sponge or lump of sugar or a piece of blotting-paper soaks in moisture, and the oil rises in the wick of a lamp.

Capital. See *Labour and Capital*.

Capital Punishment, in criminal law, the punishment by death. Formerly in Great Britain, as in many other countries, it was the ordinary form of punishment for felonies of all kinds; it is now almost entirely restricted to murder and high treason. The improvement in the penal laws of Europe in this respect may be traced in large part to the publication of Beccaria's *Treatise on Crimes and Punishments* (*Dei Delitti e delle Pene*) in 1764. At that time in England there were 160 capital offences in the statute book. The work of practical reform was initiated in 1770 by Sir William Meredith. Sir Samuel Romilly (1757-1818) introduced at short intervals a series of Bills for the abolition of the extreme sentence for minor offences. Romilly's work was taken up by Sir James Mackintosh in 1820, and under Peel's ministry with greater success. In the five years following the Reform Act, the capital offences were reduced to thirty-seven, and subsequent changes left in 1861 only four capital charges—setting fire to H.M. dockyards or arsenals, piracy with violence, treason, and murder. At the present time the last two of these may be regarded as the only capital crimes; and the statement holds good for Scotland also,

though robbery, rape, incest, and wilful fire-raising are still capital crimes in Scottish common law. In several other European countries—Sweden, Denmark, North Germany, Bavaria, Austria—there is even a greater unwillingness to enforce capital punishment than is found in Great Britain, though the penalty remains upon the statute books. Capital punishment has been done away with in Italy, Portugal, Romania (1864), and Holland (1870). In Russia capital punishment was abolished in 1917, but was reintroduced by the Government of the Soviets. In Belgium there has been no execution since 1863. In Switzerland capital punishment was abolished in 1874. In several of the states of America—Michigan, Wisconsin, Rhode Island, and Maine—imprisonment for life has been substituted for murder in the first degree; in the remainder, capital punishment is retained, though the experiment of its abolition was made for a short time in New York and Iowa.

In Great Britain and in most parts of the United States the method of execution is by hanging. In Germany and France the sword and the guillotine are the usual means; in Spain, strangulation by means of the *garrote*, a sort of iron collar tightened by a screw. In New York electrocution has been formally adopted. Since 1868 the law of the United Kingdom has required all executions to take place privately within the prison walls. Capital punishment cannot be inflicted, by the general humanity of the laws of modern nations, upon persons who are insane or who are pregnant, until the latter are delivered and the former become sane. —**BIBLIOGRAPHY:** W. Andrews, *Old Time Punishments*; A. Century of Law Reform; H. Oppenheimer, *The Rationale of Punishment*.

Capitation-tax, a tax or impost upon each head or person. A tax of this kind was first levied in England in 1377 and in 1380, the tax levied in the latter year occasioning the rebellion under Wat Tyler. It was again levied in 1513, and by Charles II in 1667, after which it remained in force till abolished by William III in 1698.

Capitol, now *Campidoglio*, the citadel of ancient Rome, standing on the Capitoline Hill, the smallest of the seven hills of Rome. It was planned by Tarquinius Priscus, but not completed till after the expulsion of the kings. At the

time of Sulla it was burned down, and rebuilt by the Senate. It suffered the same fate twice afterwards, and was restored by Vespasian and by Domitian.

Capo d'Istria, John Antony, Count (1776-1831), Greek statesman. In 1828 he became President of the Greek Republic, in which office he was very unpopular, and in 1831 he was assassinated by Constantine and George Mavromichales.

Capo d'Istria, a seaport, formerly belonging to Austria, on the Gulf of Trieste, 9 miles south of Trieste, with a cathedral. Pop. 11,765.

Cappadocia, in antiquity, one of the most important provinces in Asia Minor, the greater part of which is included in the modern province of Karaman.

Capparidaceæ, a natural order of dicotyledonous, polypetalous, herbaceous plants, shrubs and trees. Some are very poisonous, and a few are merely stimulant, as the *Capparis spinosa*, or caper-bush, the flower-buds of which constitute the capers of the shops.

Capraja, a small volcanic island belonging to Italy, about 15 miles in circumference, situated between the north point of Corsica and the coast of Tuscany. Its principal product is wine.

Caprera, a small rocky and barren Italian island, on the north-east of Sardinia, and separated from it by a narrow strait. Area, about 15 sq. miles.

Capri, an island belonging to Italy, in the Gulf of Naples, 5 miles long and 2 miles broad, rising to the height of about 1900 feet, everywhere well cultivated. The inhabitants, amounting to 5000, are occupied in the production of oil and wine, in fishing, and in catching quails at the seasons of their migrations. Capri contains the towns of Capri in the east, and Anacapri in the west. The island has several stalactitic caverns or grottos in its steep rocky coast, which are famed for the wondrous colours reflected on the rocks, the Blue Grotto being the most famous. — Cf. Norman Douglas, *Siren Land*.

Caprification, a horticultural operation performed since early times upon figs. It consists in suspending above the cultivated figs branches of the wild fig covered with a species of gall insect, which carries the pollen of the male flowers to fertilize the female flowers of the cultivated fig.

Caprifoliaceæ, a natural order of gamopetalous dicotyledons. It includes a number of erect or twining shrubs and herbaceous plants, comprising the honeysuckle, elder, viburnum, and snowberry. The characteristics of the order are opposite leaves without stipules, free anthers, epipetalous stamens, and fruit, generally a berry, sometimes dry, but not splitting open when ripe.

Caprivi, Georg Leo, Count von (1831-1899), German statesman. In 1883 Bismarck selected him to succeed Admiral Stosch as Chief of the Admiralty. He resigned in 1888, and in 1890 succeeded Bismarck as Chancellor of the German Empire and President of the Prussian Ministry. He carried several important Bills, notably one for an increase in the army, through the Reichstag. He resigned the Chancellorship in 1894.

Capsicum, a genus of annual plants, order Solanaceæ, chiefly natives of Central and South America, but spread to other tropical countries. They are cultivated for their fruit, which contains a pungent principle, capsaicin, present also in the seed. The fruit or pod is used for pickles, sauces, &c., and also both externally and internally in medicine. Several of them yield Cayenne pepper. The small type of fruit yields chillies.

Captain, one who is at the head or has authority over others, especially: (1) The military officer who commands a company of infantry, or is second-in-command of a six-gun battery of artillery, or second-in-command of a squadron of cavalry. Since the introduction of the double-company system, in 1914, a company is commanded by a major or mounted captain, and the company second-in-command is also a captain. (2) An officer in the navy commanding a ship of war. The naval captain is next in rank above the commander, and in Britain ranks with a lieutenant-colonel in the army, but after three years from the date of his commission he ranks with a full colonel. (3) The master of a merchant vessel.

Capua, a fortified city of Italy, province of Caserta, in a plain 18 miles north of Naples, on the Volturno, which is crossed by a handsome bridge. Pop. 14,000. The ancient city was situated $3\frac{1}{2}$ miles south-east of the modern town. It was a favourite place of resort of the

Romans on account of its agreeable situation and its healthy climate.

Capuchin Monkey, the name most frequently given to the Sai (*Cebus Capu-*

family of carnivorous beetles usually large, adorned with brilliant metallic colours, and either wingless or having wings not adapted for flying. They are found all over the world.

Carabobo, a state of Venezuela, washed on the north by the Caribbean Sea. Area, about 2984 sq. miles; pop. 125,514. The capital is Valencia, the chief port Puerto Cabello.

Caracal, a species of lynx (*Felis caracal*), a native of Northern Africa and South-Western Asia, about the size of a fox, and possessing great strength and fierceness.

Caracalla, Marcus Aurelius Antoninus (A.D. 188–217), Roman emperor, eldest son of the Emperor Severus, whom he succeeded in 211. To effect his own security upwards of 20,000

persons were butchered. He was himself assassinated at the instigation of Macrinus, who succeeded him.

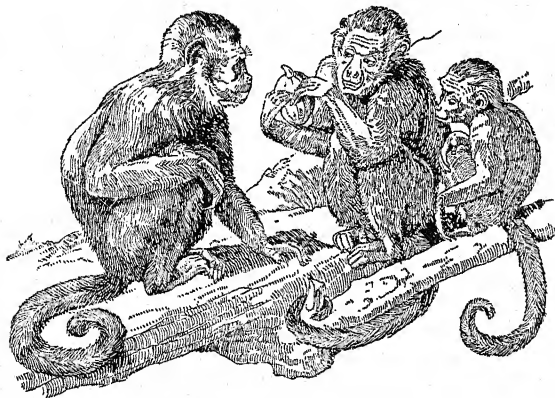
Caracara, the popular name for *Polybórus Braziliensis* (the Brazilian caracara) and several other raptorial birds of the sub-family Polyborinae, family Falconidae.

Caracas, a city of South America, capital of Venezuela, situated in a fine valley about 3000 feet above the Caribbean Sea, connected by a railway with the port La Guaira, about 10 miles distant. It has been the scene of several earthquakes. It manufactures paper, cement, textiles, and soap, and the chief exports are cocoa, coffee, and tobacco. Pop. (1926), 185,253.

Caraccioli, Francesco (1732–1799), Neapolitan admiral. In 1798 he entered the service of the Parthenopean Republic, and was arrested, contrary to the terms of capitulation, and hanged at the yard-arm of a Neapolitan frigate, Lord Nelson consenting to his execution.

Caractacus, a king of the ancient British people called Silures, inhabiting South Wales. He defended his country with great perseverance against the Romans, but was at last defeated and led in triumph to Rome, A.D. 51.

Caradoc Series, in geology, an upper division of the Lower Silurian rocks, con-



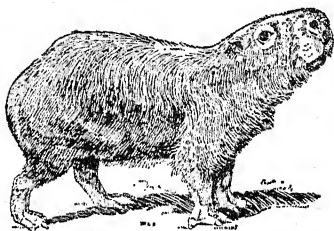
Capuchin Monkeys (*Cebus Capucinus*)

cinus), the Horned Sapajou (*C. fatuellus*), as well as to *Pithecia chiropotes*, a monkey belonging to an allied genus.

Capuchins, monks of the order of St. Francis. See *Franciscans*.

Capus, Alfred (1858–1922), French author. His best novels are: *Monsieur veut rire*, *Faux Départ*, and *Années d'Aventures*; his principal plays: *Innocent*, *Rosine*, *L'Adversaire*, and *Monsieur Piégois*.

Capybara, a species of aquatic rodent of the family Caviidae (guinea-pig), called



Capybara (*Hydrochærus capybāra*)

also the water-hog, and found in South America. It is about 4 feet long, with a large head, thick body, and webbed feet.

Carabidae, or Ground-beetles, a

sisting of red, purple, green, and white micaceous and sometimes quartzose grits and limestones containing corals, mollusca, and trilobites. Named after the hilly range of *Caer-Caradoc* in Shropshire.

Carat, a weight of 3.16 grains troy, used by jewellers in weighing precious stones and pearls. The term is also used to express the proportionate fineness of gold. Thus if a mass contain twenty-two parts of pure gold out of every twenty-four, it is gold of twenty-two *carats*.

Carausius (*d. A.D. 293*), Roman general. He landed in Britain and got himself proclaimed emperor by his legions (*A.D. 287*). In this province he was able to maintain himself six years, when he was assassinated at York.

Caravaca, a town, Spain, province of Murcia. It has manufactures of woollen and hempen goods, paper, soap, and earthenware. Pop. 16,500.

Caravaggio, Michel Angelo Amerighi (1569–1609), Italian painter. He was considered the head of the so-called *Naturalisti* school. Among his chief pictures are: *The Card Player*, *The Burial of Christ*, and *a Holy Family*.

Caravaggio, a town of North Italy, province of Bergamo. Michel Angelo Amerighi and Polidoro Caldara were born here. Pop. 9000.

Caravanserai, in the East, a place appointed for receiving and lodging caravans; a kind of inn where the caravans rest at night, being a large square building with a spacious court in the middle. Though caravanserais in the East serve in place of inns, the traveller finds nothing in a caravanserai for the use either of himself or his cattle.

Caravellas, a seaport of Brazil, state of Bahia, the principal port of the surrounding country, and the head-quarters of the Abrolhos Islands whale-fishery. Pop. about 8000.

Caraway, an umbelliferous biennial plant from which a seed used in confectionery, and the preparation of a carminative oil and of kummel is obtained; grown chiefly in Holland, Germany, and Russia.

Carbazotic Acid. See *Picric Acid*.

Carbides, compounds of a metal with carbon, produced at high temperatures usually by means of an electric furnace. From calcium carbide acetylene gas is prepared.

Carbohydrate, a generic name in chemistry applied to compounds like glucose, cane-sugar, cellulose, starch, &c., made up of carbon, hydrogen, and oxygen, the two latter being commonly in the same proportion as in water (H_2O).

Carbolic Acid, phenol, C_6H_5OH , a derivative of benzene obtained from coal-tar. When pure, phenol is a colourless crystalline substance possessing a strong odour and a burning taste, and is soluble in water, but tends to become more coloured when kept. Carbolic acid is poisonous, blisters the skin, and arrests fermentation and putrefaction; hence it is much used as a disinfectant in medicine and surgery.

Carbon (chemical symbol, C; atomic weight, 12), an element existing uncombined in three forms; charcoal or amorphous carbon, graphite or plumbago, and diamond. The diamond is the purest form of naturally-occurring carbon. Lamp-black is the purest form of amorphous carbon; charcoal, coal, and anthracite are more or less mixed with other substances. Carbon may be obtained from most organic substances, animal or vegetable, by distillation out of contact with air, when volatile substances distil off, leaving a residue of carbon. The compounds of this element are classified under the name *organic compounds*. With hydrogen it forms a large number of compounds called *hydrocarbons*, some of which are of great economic importance. With oxygen, carbon forms two compounds: *carbon dioxide*, if burnt in air; *carbon monoxide*, if the supply of air be limited. It is a regular constituent of all animal and vegetable tissues in combination with hydrogen, oxygen, and many other elements.

Carbonari, an Italian political secret society, which was formed by the Neapolitan republicans during the reign of Joachim Murat, and had for its object the expulsion of the strangers and the establishment of a democratic government. The ritual of the Carbonari was taken from the trade of the charcoal-burner. A lodge was *baracca* (a hut); a meeting was *vendita* (a sale); an important meeting *alta vendita*. There were four grades in the society; and the ceremonies of initiation were characterized by many mystic rites. After the suppression of the Neapolitan and Piedmontese revolution in 1821, the Carbonari, throughout Italy,

were declared guilty of high treason, and punished as such by the laws. Expelled from Italy, the Carbonari began to take root in France, and Lafayette became their chief.—BIBLIOGRAPHY: R. M. Johnston, *Napoleonic Empire in Southern Italy*, and *the Rise of the Secret Societies*; B. King, *A History of Italian Unity*.

Carbonates, the salts of carbonic acid, e.g. CaCO_3 , calcium carbonate; Na_2CO_3 , sodium carbonate; BaCO_3 , barium carbonate; NaHCO_3 , sodium bicarbonate. Many of the carbonates are extensively used in the arts and in medicine.

Carbondale, an American city, state of Pennsylvania. It is the centre of a rich coal-field. Pop. 17,040.

Carbon Dioxide, or **Carbonic Anhydride**, is a colourless, poisonous heavy gas composed of carbon and oxygen. It is the final product of the complete combustion of carbon, and is also produced during the fermentation and decomposition of organic matter and in the process of respiration. Plants absorb carbon dioxide from the air, utilize the carbon to build up their structure, and return the oxygen to the air. Carbon dioxide is found free in many volcanic regions, and is also present dissolved in water in many mineral springs. Combined with the oxides of metals, it occurs as carbonates in many minerals. It is not an active poison; but air containing even 0.5 per cent has an injurious effect. Aerated beverages of all kinds owe their refreshing quality to its presence. Carbon dioxide is easily liquefied and solidified, and is manufactured in large quantity for various industrial purposes. The gas is used in sugar-refining, white-lead manufacture, and in the manufacture of sodium bicarbonate. In the liquid form it is also used for aerating beverages, in some types of ice-machine, for hardening steel, for the production of extreme cold, and in certain types of fire-extinguishers.

Carbon Disulphide (CS_2), a compound formed by burning carbon in sulphur vapour. It is a colourless, extremely volatile liquid, boiling at 46°C ., non-miscible with water, and both the liquid and its vapour are highly inflammable. It is largely used as a solvent for sulphur, phosphorus, iodine, &c., and as a fat-extractor.

Carboniferous System, in geology, the great group of strata which lies between the Old Red Sandstone below and the

Permian formation above, named from the quantities of coal and carbonaceous shale contained in them. They include, in England, the coal-measures, millstone grit, and a lower series consisting largely of marine limestone. The coal-measures include the most productive seams of our coal-fields. Iron ore, limestone, clay, and building-stone are also yielded abundantly by the Carboniferous strata (see *Coal*). Fossil plants are very numerous in the Carboniferous rocks. The trees include large lycopods and horse-tails, and a highly-interesting series known as Pteridosperms. Some conifers and cycads also occur.

Carbon Monoxide, or **Carbonic Oxide** (CO), a colourless, tasteless, odourless, poisonous gas produced when carbon is burned in a limited supply of air or when carbon dioxide is passed over red-hot coke. It is combustible, and burns with a pale-blue flame, producing carbon dioxide. The gaseous fuels *water gas* (q.v.) and *producer gas* (q.v.) are largely composed of carbon monoxide, and the source of much of the heat developed by their combustion is the energy released when the monoxide is converted into carbon dioxide by absorption of oxygen. Carbon monoxide is a reducing agent, and is used in many metallurgical processes.

Carbon Tetrachloride, CCl_4 , a substance resembling chloroform in odour, and prepared by the action of chlorine on carbon disulphide. It is a colourless liquid, a valuable solvent for shellacs, gums, and resins, and has been used in some types of fire-extinguishers. Carbon tetrachloride is registered under the trade name *benzinoform*.

Carborundum, a compound of silicon and carbon (silicon carbide) formed by the action of carbon (graphite) on sand in an electric furnace. It is crystalline, dark and lustrous, and its hardness makes it important as an abrasive material.

Carbuncle, a gem of a deep-red colour with a mixture of scarlet, found in the East Indies. When held up to the sun it loses its deep tinge, and becomes exactly of the colour of a burning coal.

Carbuncle, in surgery, an inflammation of the true skin and tissue beneath it akin to that occurring in boils. It has several cores, and is associated with a bad state of general health. The principal local treatment is to make a free incision into

the tumour, getting rid of as much of the purulent matter as possible, when a poultice should be applied.

Carburetted Hydrogen. See *Methane*.

Carcagente, a town, Spain, province of Valencia. It has a trade in grain, fruits, and silk. Pop. 13,520.

Carcassonne, capital of the department of Aude, France, on the Aude and a branch of the Canal du Midi. It is divided into two sections by the Aude. The staple manufacture is woollen cloth. Pop. 31,020.

Cardamoms, the aromatic capsules of different species of plants of the nat. ord. Scitamineæ (gingers), employed in pharmacy as well as an ingredient in sauces and curries.

Cardan, Girolamo (1501–1576), Italian philosopher, physician, and mathematician. He made some important discoveries in algebra, studied astrology, and wrote a large number of books. His chief works are: *De Vita Propria*, an account of himself; *Ars Magna*, a treatise on Algebra; *De Rerum Varietate*; and *De Rerum Subtilitate*.

Cardenas, a seaport on the north coast of Cuba, connected with Havana by rail. One of the principal commercial centres of the island, it exports sugar, molasses, and coffee. Pop. (1928), 28,748.

Cardiff, a city, seaport, and the county town of Glamorganshire, Wales, at the mouth of the Taff on the estuary of the Severn. It is the principal outlet for the mineral produce and manufactures of South Wales, and is the chief coal exporting town in the British Isles. Iron shipbuilding is carried on, and there are iron and other works on a large scale. The docks are extensive and well constructed (total area, 150 acres), and can accommodate the largest vessels. Ships of 12,000 tons can enter several of the wet- and graving-docks at all states of the tide. The ancient castle, dating from 1080, is the property of the Marquess of Bute, and has been modernized and part of it converted into a residence. The development of Cardiff has been greatly furthered by those in charge of the Bute property, which embraces most of the town. Pop. (1931), 223,648.

Cardigan, the county town of Cardiganshire, South Wales, on the River Teifi, about 3 miles from its mouth in Cardigan Bay. Vessels of light tonnage

come up to the wharves. Fishing is extensively carried on. Pop. (1931), 3309.

Cardiganshire, Wales, has an area of 443,189 acres, of which two-thirds are under crops or pasture. The surface of the northern and eastern parts is mountainous, but interspersed with fertile valleys; while the southern and western districts are more level and produce abundance of corn. The county has an extensive coast-line, and many of the male population are sailors and fishermen. It is rich in metalliferous lodes, the lead-mines still yielding largely. The largest town is Aberystwyth. Pop. (1931), 55,164.

Cardigan Bay, a large open expanse of sea on the west coast of Wales, having Cardiganshire on the east and Carnarvon on the north.

Cardinal, an ecclesiastical prince and the highest dignity in the Roman Catholic Church. The cardinals are divided into three classes or orders, comprising six bishops, fifty priests, and fourteen deacons, making seventy at most. There are generally, however, from ten to fifteen vacancies. The chief symbol of the dignity of cardinal is a low-crowned, broad-brimmed red hat. Other insignia are a red biretta, a scarlet cassock, a sapphire ring, &c.

Cardinal Bird (*Cardinalis virginianus*), a North American bird of the finch family, with a fine red plumage, and a crest on the head.

Cardinal-flower, the name commonly given to *Lobelia cardinalis*, because of its large, very showy, and intensely red flowers cultivated in gardens in Britain.

Cards, **Playing**, are of Eastern origin, and there is evidence that they were in use in Egypt. They were known in Europe in the fourteenth century, but were not commonly used until the beginning of the fifteenth. In Britain since 1862 there has been a Government duty of 3d. on each pack. The import duty levied upon one dozen packs was 3s. 9d., according to the tariff in operation in 1920.—**BIBLIOGRAPHY:** W. A. Chatto, *Facts and Speculations on the Origin and History of Playing Cards*; E. S. Taylor, *History of Playing Cards*.

Carducci, Giosue (1836–1907), Italian poet. Among his works are: *Juvenilia* (1850–1860), *Levia Gravia* (1860–1871), *Giambi ed epodi* (1867–1879), *Odi barbari* and *Rime e ritmi* (1880–1900).

Cardwell, Edward, Viscount Cardwell

(1813–1886), English politician. Under Lord Aberdeen he became President of the Board of Trade in 1853. In Palmerston's Cabinet of 1859 he became Secretary for Ireland, and was Colonial Secretary from 1864 to 1866. As War Secretary under Gladstone, from 1868 to 1874, he introduced great reforms in the army, including the short service and reserve system, and abolition of the purchase of commissions.

Carew (pronounced as if spelt 'Carey'), Thomas (1595–1645), English poet. He wrote much polished verse, and was a friend of Jonson and Donne. His works consist of masques, lyrics, and sonnets, and were first printed in 1640.

Carex, a large genus of plants, nat. ord. Cyperaceæ, consisting of the sedges, of which sixty species are indigenous to Britain. They may be distinguished at sight from grasses by their three-sided stems and three-ranked leaves.

Carey, Henry (1696–1743), English composer, dramatist, and poet. He composed the words and music of many popular songs, including *Sally in Our Alley* and *God Save the King*.

Carey, Henry Charles (1793–1879), American economist. In 1836 he published an essay on the Rate of Wages, which he afterwards expanded into *Principles of Political Economy*. His other important works are: *The Credit System*; *The Past, the Present, and the Future*; *The Principles of Social Science*; *Review of the Decade 1857–67*; and *The Unity of Law*.

Carey, William (1761–1834), English Oriental scholar and Christian missionary. In 1793 he sailed for the East Indies as a Baptist missionary, and in 1800, in conjunction with Marshman, Ward, and others, he founded the missionary college at Serampore. Here he had a printing-press, and issued various translations of the Scriptures. His first work was a *Bengali Grammar*. It was followed by the *Hitopadesa*, in the Mahratta tongue, a *Grammar of the Telinga and Carnatic*, and a *Bengali Lexicon*.

Cartgill, Donald (1610–1681), Scottish covenanting preacher. He had a principal hand in the Queensferry and Sanquhar Declarations. For formally excommunicating Charles II, the Duke of York, and others, he was executed at Edinburgh for high treason.

Caria, an ancient country, forming the

south-western corner of Asia Minor, and partly settled in early times by Greek colonists chiefly of the Dorian race. Cnidus, Halicarnassus, and Miletus were among the chief towns.

Caribbean Sea, that portion of the North Atlantic Ocean lying between the coasts of Central and South America and the West India Islands.

Caribbees, or Lesser Antilles, usually divided into the Windward and Leeward Islands (q.v.), a section of the West India Islands.

Caribou, the name of two American species of reindeer, ranking in size next to the moose and elk. The woodland caribou, found in Canada, Newfoundland, and Labrador, is like the common reindeer, and is migratory in its habits. The Parren Ground caribou is smaller, lives in North-West Canada and Greenland, and migrates to the Arctic Ocean in summer.

Caribs, the original inhabitants of the West Indian Islands. At present only a few remain on Trinidad, Dominica, and St. Vincent.

Caricature, a representation of the qualities and peculiarities of an object, but in such a way that beauties are concealed and peculiarities or defects exaggerated, so as to make the person or thing ridiculous, while a general likeness is retained. Egyptian art has numerous specimens of caricature, and it has an important place in Greek and Roman art. It flourished in every European nation during the Middle Ages, and in the present day it is the chief feature in the comic papers. The chief masters of caricature in Britain are Hogarth, Gillray, Rowlandson, Bunbury, John Doyle ('H. B.'), Leech, Richard Doyle, Cruickshank, Tenniel, &c. *Punch* and *Vanity Fair* contain the best examples of caricature in contemporary British art. Among more recent artists mention should be made of Du Maurier, Phil May, Harry Furniss, Max Beerbohm, and Sir F. C. Gould.—BIBLIOGRAPHY: Thomas Wright, *History of Caricature and Grotesque in Literature and Art*; Graham Everitt, *English Caricaturists and Graphic Humorists of the 19th Century*.

Carimata, an island about 50 miles from the coast of Borneo. It is about 10 miles long, and rises to a height of 2000 feet. It is visited by Malays, who collect tortoise-shell, trepang, and edible birds' nests.

Carini, a town of Sicily, 11 miles w.n.w. of Palermo. Pop. 13,930.

Carinthia, formerly a western duchy of Austria, on the borders of Italy. By the Peace Treaty (1919) Austria retained Carinthia, except the south-eastern corner. The area is 3688 sq. miles. It is extremely mountainous, generally sterile, and very thinly populated. The principal river is the Drava. The iron-, lead-, and calamine-mines are the main sources of its wealth, though there are several manufactories of woollens, cottons, silk-stuffs, &c., most of which are in Klagenfurt, the capital. Pop. 370,432.

Carissimi, Giovanni Giacomo (1604-1674), Italian musical composer. He wrote many oratorios, cantatas, and motets, and occupies an important place in the history of music.

Carleton, William (1794-1869), Irish novelist. In 1830 he published his *Traits and Stories of the Irish Peasantry*. Among his other works are: *The Misfortunes of Barney Branagan*, *The Tithe Proctor*, *Willy Reilly*, and *The Evil Eye*.

Carleton Place, a town of Ontario, Canada, 27 miles from Ottawa, on the C.P.R. main line from Montreal to Winnipeg. It has sawmills, flour-mills, and knitted goods factories. Pop. 3841.

Carlisle, city and county town of Cumberland, England, at confluence of Eden, Caldew, and Petteril. It was held by the Scots during their tenure of Cumberland, and the church of St. Mary's was founded by David I, who died there. During the border wars Carlisle underwent many sieges. It surrendered to Charles Edward in 1745. In the various improvements of the city all the walls, gates, and fortifications have been removed, except a portion of the west wall, and the castle. It has an agricultural college. Carlisle is the seat of various manufactures, of which cotton is the principal. It was formerly connected by canal with Port-Carlisle, on the Solway Firth, a distance of about 11 miles; but this canal is replaced by a railway to Port-Carlisle, which is extended to Silloth, where an extensive dock has been constructed. The Citadel Station is the terminus of seven different lines of railway. Pop. (1931), 57,107.

Carlisle, a town of the U.S.A., in Pennsylvania. Pop. 10,303.

Carlos, Don (1545-1568), Prince of Asturias, son of Philip II. He was de-

formed in person, and of a violent and vindictive disposition, and was consequently excluded from the succession. In consequence of this he is supposed to have entered into a plot against the king; he was found guilty, and imprisoned; he died shortly after, and King Philip's enemies asserted that he had been killed at the king's own orders. The story of Don Carlos has furnished the subject of several tragedies, viz. by Thomas Otway (English), Schiller (German), and Alfieri (Italian).

Carlos de Bourbon, Don Maria Isidor (1788-1855), was heir presumptive to the throne of Spain until the birth of Maria Isabella in 1830. On the death of his brother he claimed the throne, and was recognized by a considerable party, who excited a civil war in his favour, and thenceforward were designated by the title of *Carlists*. After several years' fighting, he found himself obliged in 1839 to take shelter in France. In 1845 he resigned his claims in favour of his eldest son, Don Carlos (1818-1861), who tried to excite several abortive insurrections. His nephew, Don Carlos (1848-1909), Duke of Madrid, was the next representative of the Carlists. In 1873 he instigated a rising in the north of Spain, and continued the struggle till after Alfonso XII came to the throne, when he was defeated and withdrew. A short time before his death he abdicated in favour of his son, Don Jaime de Bourbon (born in 1870), who is the present representative of the Carlists.

Carlos I (1863-1908), King of Portugal. He ascended the throne on the death of his father on 19th Oct., 1889. A revolution broke out in Portugal in 1907, and on the 1st Feb., 1908, the king and his eldest son, Luiz, were assassinated in Lisbon.

Carlovingians, the second dynasty of the French or Frankish kings, which supplanted the Merovingians, deriving the name from Charles Martel or his grandson Charlemagne (q.v.). The dynasty came to an end with Louis V, who died in 987.

Carlow, an inland county of the Irish Free State, province of Leinster, surrounded by Kildare, Wicklow, Wexford, Kilkenny, and Leix (Queen's County). Area, 344 sq. miles, or 221,485 acres. The chief rivers are the Slaney and Barrow. From the remarkable fertility of its soil

it is altogether an agricultural county, producing a great deal of butter, corn, flour, and other agricultural produce for exportation. Pop. (1926), 34,504.

Carlow, the chief town of Carlow county, is on the left bank of the Barrow. It is the principal mart for the agricultural produce of the surrounding country, and has flour-mills. Pop. (1926), 7175.

Carlowitz, a town on the Danube, 7 miles south-east of Peterwardein; the centre of a famous wine-growing district. Pop. 5800.

Carlsbad, a town now belonging to Czechoslovakia, in Bohemia, famous for its hot mineral springs, and much frequented by visitors from all parts of the world. Its waters are useful in diabetes, gout, and biliary diseases. Permanent pop. about 17,446.

Carlsburg, a town and fortress of Transylvania, Rumania. Pop. 11,616.

Carlskrona, a fortified seaport at the southern extremity of Sweden, on the Baltic. It stands on several rocky islets connected with one another and with the mainland by bridges. It is the chief Swedish naval station, the harbour being safe and spacious, with dry docks, shipyards, arsenal, &c. It has a considerable export trade in timber, tar, potash, and tallow. Pop. 28,393.

Carlsruhe, the capital of the Republic of Baden. The former Grand-ducal library contains 100,000 vols.; there are also a large public library, valuable museums and art collections, a botanic garden, polytechnic school, &c. The industries are active and varied. Pop. (1925), 145,694.

Carlstad, a town, Sweden, on an island in Lake Wener, connected with the mainland by two bridges. Pop. 20,000.

Carlstadt, or Andreas Rudolf Bodenstern (1480-1541), German reformer. About 1517 he became one of Luther's warmest supporters, but afterwards quarrelled with him, and commenced the controversy respecting the sacrament, denying the bodily presence of Christ in the sacramental elements. This controversy ended in the separation of the Calvinists and Lutherans.

Carlton, a town of England, near Nottingham, with manufactures of lace and hosiery. Pop. (1931), 22,386.

Carlisle, a town of Scotland, in Lanarkshire, in a coal and iron centre. It has fruit-preserving works. Pop. (parish), 10,507.

Carlyle, Alexander, generally known as 'Jupiter' Carlyle (1722-1805), Scottish Presbyterian minister. In his old age he wrote an *Autobiography*, which was not published till 1860. It presents a most vivid picture of Scottish society in the eighteenth century.

Carlyle, Thomas (1795-1881), British essayist, historian, and philosopher. In his fifteenth year he was sent to the University of Edinburgh. He became a teacher in 1814, first at Annan, afterwards at Kirkcaldy. In 1818 he removed to Edinburgh, where he supported himself by literary work. His first writings were short articles for the *Edinburgh Encyclopedia*. His career as an author may be said to have begun with the issue of his *Life of Schiller* in the *London Magazine*, in 1823. In 1824 appeared his translation of Goethe's *Wilhelm Meister's Apprenticeship*. In 1826 he married Jane Baillie Welsh. After his marriage he resided for a time in Edinburgh, and then withdrew to Craigenputtock, a farm in Dumfriesshire belonging to his wife. Here he wrote *Sartor Resartus*, which was finished in 1831, but which only appeared in 1833 in *Fraser's Magazine*. Carlyle became famous, and removed to London in 1834. He fixed his abode at Cheyne Row, Chelsea, where his life henceforth was mainly spent. His next work of importance was *The French Revolution*, published in 1837. About this time, and in one or two subsequent years, he delivered several series of lectures, the most important of these, *On Heroes and Hero-worship*, being published in 1840. *Chartism*, published in 1839, and *Past and Present*, in 1843, were small works bearing on the affairs of the time. In 1845 appeared his *Oliver Cromwell's Letters and Speeches, with Elucidations*, a work of great research. In 1850 came out his *Latter-day Pamphlets*. He next wrote a life of his friend John Sterling, published in 1851. The largest and most laborious work of his life, *The History of Friedrich II of Prussia, called Frederick the Great*, next appeared (1858-1865). In 1866 he suffered a severe blow in the loss of his wife. From this time his productions were mostly articles or letters on topics of the day, including *Shooting Niagara; and After?* in which he gave vent to his serious misgivings as to the result of the Reform Bill of 1867. He had appointed James Anthony Froude his literary exe-

cutor, who, in conformity with his trust, published *Reminiscences of Thomas Carlyle* (1881); *Thomas Carlyle: the First Forty Years of his Life* (1882); *Letters of Jane Welsh Carlyle* (1883); and *Thomas Carlyle: Life in London* (1884). Other works are: *Early Letters of Thomas Carlyle*, edited by Charles E. Norton (1886); *Correspondence between Goethe and Carlyle* (1887); *New Letters and Memorials of Jane Welsh Carlyle*, edited by Alexander Carlyle (1903); *The Love Letters of Thomas Carlyle and Jane Welsh*, same editor (1909). —BIBLIOGRAPHY: A. S. Arnold, *Story of Thomas Carlyle*; R. S. Craig, *The Making of Carlyle*; F. W. Roe, *Carlyle as Critic of Literature*.

Carmagnola, a town of Northern Italy, 18 miles S.S.E. of Turin. It is noted for its annual silk fairs. Pop. 12,050.

Carmarthen, a maritime county, South Wales, the largest of the Welsh counties area, 588,472 acres, of which about 440,069 are under tillage or permanent pasture. It is of a mountainous character generally. The principal river is the Towy. The mineral products of the county are iron, lead, coal, and limestone. The chief towns are Carmarthen and Llanelly. Pop. (1931), 179,063.

Carmarthen, the county town of Carmarthenshire, Wales, on the Towy, which is navigable. It is a county of a town. There are some tin- and lead-works, cloth manufactories, and iron-foundries, and the salmon-fishery is extensive. Pop. (1931), 10,310.

Carmarthen Bay, a bay of South Wales, opening from the Bristol Channel between Giltar Point and Worms Head.

Carmaux, a town of Southern France, department of Tarn, in a district which yields considerable quantities of coal; the chief manufacture is glass. Pop. 10,000.

Carmel, a range of hills in Palestine, extending from the Plain of Esdraelon to the Mediterranean, and terminating in a steep promontory on the south of the Bay of Acre. It has a length of about 16 miles, and its highest point is 1850 feet above the sea.

Carmelites, mendicant friars of the order of Our Lady of Mount Carmel. From probably the fourth century holy men took up their abode as hermits on Mount Carmel in Syria, but it was not till about the year 1150 that pilgrims established an association for the purpose of leading a secluded

life on this mountain, and so laid the foundation of the order. Being driven by the Saracens to Europe in 1247, they adopted all the forms of monastic life and a somewhat milder rule. In time they became divided into several branches, one of them distinguished by walking barefooted. They are still to be seen in Roman Catholic countries. The habit of the order is of a dark-brown colour, and over it when out of doors they wear a white cloak, with a hood to cover the head.

Carminatives, medicines obtained chiefly from the vegetable kingdom, and used as remedies for flatulence and spasmodic pains. They include peppermint, ginger, cardamoms, anise, and caraway.

Carmona, a town of Spain, in Andalusia. It trades in oil, wine, and cereals. Near the town a number of ancient rock-cut tombs have been opened up. Pop. 21,500.

Carnac, a village in Brittany, department of Morbihan, on a height near the coast, 15 miles south-east of Lorient, and remarkable for the so-called Druidical monuments in its vicinity. These consist of eleven rows of unhewn stones, which are evidently of very ancient date. Pop. (commune), 3160.

Carnallite, a hydrated chloride of potassium and magnesium, one of the most important 'potash salts' of the Stassfurt district in Prussia; though carnallite is sometimes sold crude as a fertilizer, the potassium is usually extracted as potassium sulphate.

Carnarvon, now **Caernarvon**, a maritime county of North Wales, forming the N.W. of the mainland; area, 365,986 acres. It is traversed by lofty mountains, including the Snowdon range, whose highest peak is 3571 feet, and the highest mountain in South Britain. Lakes are numerous, but the only river of importance is the Conway, which separates the county from Denbighshire. The chief mineral is slate, large quantities of which are exported. Pop. (1931), 120,810.

Carnarvon, now **Caernarvon**, the county town of Carnarvonshire, Wales, is a seaport on the Menai Strait. Here is situated the castle of Edward I, in which the first Prince of Wales (Edward II) was born. Carnarvon is a sea-bathing resort, and the shipping trade is considerable. Pop. (1931), 8,460.

Carnatic, the district in South-Eastern

India extending from Cape Comorin to the Northern Circars, lying east of the Ghats, and reaching to the sea on the Coromandel coast. It is now included in the Presidency of Madras.

Carnation, the popular name of varieties of *Dianthus Caryophyllus*, the clove-pink.

Carnauba, the Brazilian name of the palm *Copernicia cerifera*, which has its leaves coated with waxy scales, yielding a useful wax. The wood is used in building.

Carneades (213–129 B.C.), Greek philosopher, founder of the third or new academy. Carneades held that although man has no infallible criterion of truth, yet we infer appearances of truth, which, as far as the conduct of life goes, are a sufficient guide.

Carnegie, Andrew (1835–1919), multimillionaire and philanthropist. He went to America in 1848, and made an immense fortune in connexion with iron and steel works at Pittsburgh. During his latter years he resided chiefly in Scotland, having purchased the estate of Skibo in Sutherlandshire. He gave away immense sums of money for useful objects, both in Britain and America, especially for the building of libraries and the advancement of education. One of his greatest single gifts was that of £2,000,000 to the Scottish universities. His publications include: *The Gospel of Wealth*, *The Empire of Business*, and *Problems of To-day*.—Cf. B. Alderson, *Andrew Carnegie: the Man and his Work*.

Carniola, formerly a duchy or province of Austria, but now belonging to Yugoslavia; area, 3845 sq. miles. It is a mountainous and barren region, and is remarkable for its underground rivers, winter lakes, and stalactite caverns. There are iron-, lead-, and quicksilver-mines, and abundance of coal, marble, and valuable stone. Pop. 530,189. The capital is Laibach.

Carnival, the feast or season of rejoicing before Lent, observed in Catholic countries with much revelry and merriment. In some of the cities of Italy, especially Rome, Milan, and Naples, it is still a great popular festival, as well as in the Catholic cities of the Rhine Valley, Mayence, Bonn, but above all Cologne. In Spain the carnival festivities last four days, whilst in France they are restricted to Shrove Tuesday, or *mardi gras*.

Carnivora, a term applied specially to

an order of mammals which preys upon other animals. They are often divided into Plantigrada, comprising the bears, badgers, raccoons, &c.; Digitigrada, comprising lions, tigers, cats, dogs; and Pinnipedia or Pinnigrada, comprising the seals and walruses. The two former divisions are also classed together as Fissipedia. The typical Plantigrada are distinguished by their putting the whole sole of the foot to the ground in walking, while the Digitigrada walk on the tips of their toes. The Plantigrada are also less decidedly carnivorous, and feed much on roots, honey, and fruits. In the Pinnigrada the body is long and of a fish shape, the fore- and hindlimbs are short and form broad webbed swimming-paddles. The hind-feet are placed far back, and more or less tied down to the tail by the integuments.

Carnivorous Plants, plants which derive nourishment directly from the bodies of insects or other small creatures entrapped by them in various ways. Such plants, of which there are several hundred kinds, mostly belong to the nat. ords. Sarraceniaceæ or Pitcher-plants, Droseraceæ, Lentibulariaceæ, and Nepenthaceæ. In all these the apparatus for catching insects consists of a modified leaf or portion of a leaf. The species of *Drosera* or Sun-dew have their leaves provided with stalked glands, which exude a clear sticky juice. When an insect alights on any of these glands, those in the neighbourhood bend towards it in order to secure it more effectively. The common Butterwort of Britain (*Pinguicula vulgaris*) also has leaves which catch and digest insects by means of glandular hairs; and the Bladderworts (*Utricularia*) bear tiny submerged pitchers provided with a curious trap-door device.

Carnot, Lazare Hippolyte (1801–1888), French philosopher, follower of Saint Simon, and democratic leader. He was a son of L. N. M. Carnot.

Carnot, Lazare Nicolas Marguerite (1753–1823), French statesman, general, and strategist, known as 'the organizer of victory' during the early wars of the French Revolution. Carnot was appointed Minister of War by Napoleon (1800), but remained in principle an inflexible Republican, voted against the consulship for life, and protested against Napoleon's assumption of the imperial dignity. For seven years after this he remained in retirement,

publishing several valuable military works. In 1814 Napoleon gave him the chief command at Antwerp, and in 1815 the post of Minister of the Interior.

Carnot, Marie François Sadi (1837-1894), President of the French Republic from 1887. He met his death by assassination. He was a son of L. H. Carnot.

Carnot, Sadi Nicolas Leonard (1796-1832), French engineer, the founder of the science of thermodynamics (q.v.). He was a son of L. N. M. Carnot.

Carnoustie, a burgh of Scotland, on the coast of County Angus; carries on the jute manufacture, boot and shoe making, iron-founding, and other industries; and its bathing facilities and fine golf-links attract many visitors. Pop. (1931), 4806.

Carob Tree, or Algaroba-bean (*Ceratonia siliqua*), a leguminous plant of the sub-order Cæsalpiniæ, growing wild in all the countries on the Mediterranean. The names *locust-beans* and *St. John's bread* have been given to the legumes of this plant, from an idea that they were the food eaten, along with wild honey, by the Baptist in the wilderness. In the south of Europe they are principally used as food for horses, and they are imported into Britain as a food for cattle.

Carolina, North, one of the United States of America, bounded north by Virginia, east by the Atlantic, south by South Carolina and Georgia, and west by Tennessee; area, 52,426 sq. miles. The principal rivers are the Roanoke, Neuse, Cape Fear, and Yadkin. The coast is difficult of access, being fringed by a line of narrow sandy islands, between which and the mainland the passages are mostly shallow and dangerous. There are three noted capes on the coast, Cape Hatteras, Cape Lookout, and Cape Fear, all dangerous to seamen. North Carolina is generally a dead level for 40 to 60 miles inland, this part largely consisting of cypress swamps; next comes a fine undulating country largely under cultivation or clothed with deciduous trees; lastly comes the region of the Appalachians, with Mount Mitchell (6707 feet) the highest of all: fine fruits and picturesque scenery are here the characteristics. The mineral resources are highly valuable, including coal and iron in abundance, silver, lead, zinc, emery, &c. In the level parts the soil generally is but indifferent. On the banks of some of the rivers, however, and in the more elevated

ground, the soil is very fertile. Cotton is grown in large quantities in the sandy isles and the flat country; rice is grown largely among the swamps. The chief staples, however, are Indian corn, tobacco, wheat, oats, and sweet-potatoes. The pitch-pine, which grows abundantly in the low districts, is one of the most valuable productions, affording the pitch, tar, turpentine, and various kinds of lumber which together constitute about one-half of the exports of North Carolina. School attendance is compulsory, and there are separate schools for white and for coloured children. Higher instruction is given in fifteen university and college institutions. The largest towns are Charlotte, Winston-Salem, Wilmington, and Durham. Raleigh is the capital. In 1720 the two Carolinas were separated into North and South Carolina. In 1861 the state seceded from the Union, and it was not formally restored till 1868. Pop. 2,559,123.—BIBLIOGRAPHY: Connor, Boyd, and Hamilton, *History of North Carolina*; R. D. W. Connor, *North Carolina Manual*.

Carolina, South, one of the United States of America, bounded north by North Carolina, east by the Atlantic, south-west and west by Georgia; area, 30,989 sq. miles (494 being water). Columbia is the seat of government, but Charleston is much the largest town. The chief rivers are the Great Pedee and the Congaree and Wateree, which unite to form the Santee, together with the Savannah forming the boundary between South Carolina and Georgia. These and other rivers form an inland navigation system of 2400 miles. There is now also a considerable network of railways, the total mileage being 3963 in 1921. The principal harbour is that of Charleston. Numerous small islands along the coast supply the famous Sea-island cotton. In physical constitution South Carolina resembles its northern neighbour, a great level plain of forest and swamp extending westward from the sea, till it begins 100 miles inland to rise in ranges of sand-hills, and finally reaches ranges of 4000 feet in the Appalachians. In this western district the land is fertile, well cultivated, and watered by considerable streams. The staple products of the state are cotton and rice, of which great quantities are annually exported. The cultivation of wheat, barley, oats, and other crops has been comparatively neglected.

The rice-lands of South Carolina give employment to thousands of coloured people. South Carolina is rich in minerals, including gold, iron, manganese, copper, lead, granite, limestone, and valuable phosphate-marls. The commerce is considerable, the chief exports being cotton, rice, timber, and naval stores. School attendance is not compulsory, but there are restrictions on the employment of illiterate children in mines or factories. The University of South Carolina was founded at Columbia in 1805. In 1695 the cultivation of rice was introduced by Governor Smith; that of cotton followed; and on these two staples the colony soon began to flourish. South Carolina was the first of the states to secede from the Union. Pop. 1,683,724.—BIBLIOGRAPHY: E. M'Crady, *The History of South Carolina*; E. J. Watson, *Handbook of South Carolina*.

Caroline Islands, a large archipelago, North Pacific Ocean, between the Philippines and the Marshall Isles, first discovered by the Spaniards. Many of the islands are mere coral reefs little elevated above the ocean. They form many groups, the most important being the Palaus, and those to which the largest islands of all, Yap and Ponape, respectively belong. The population is estimated at 30,000, made up of inhabitants of different races and stages of civilization. The most important vegetable productions are palms, bread-fruit trees, and bananas. Some trade is carried on at Yap and Ponape. The islands were sold by Spain to Germany in 1899, were occupied by the Japanese in 1914, and were mandated to Japan in 1922.—BIBLIOGRAPHY: F. W. Christian, *Caroline Islands*; W. H. Furness, *The Island of Stone Money*.

Carolus - Duran, Émile Auguste (1838-1917), French painter. He first attracted attention by his two pictures *The Evening Prayer* and *The Victim of Assassination*. He became famous in 1869 through his painting *Lady with the Glove*, a portrait of his wife, which is now at the Luxembourg Museum. Carolus-Duran was also active in painting historical and religious subjects, such as *L'Ultima ora di Cristo*. He also wrote novels and short stories under the name of *Charles Durand*, his original name.

Carotid Arteries, the two great arteries which convey the blood from the aorta to the head and the brain. The common

carotids, one on either side of the neck, divide each into an external and an internal branch. Wounds of the carotid trunks cause almost immediate death.

Carp (Cyprinus), a genus of soft-finned fishes (type of the family Cyprinidae), of which sixteen species are British, distinguished by the small mouth, toothless jaws, and gills of three flat rays. They have but one dorsal fin, and the scales are generally of large size. They frequent fresh and quiet waters, feeding chiefly on vegetable matters, also on worms and molluscs. The common carp (*C. carpio*) is olive-green above and yellowish below, and in many parts is bred in ponds for the use of the table. The well-known gold-fish is *C. auratus*, believed to be originally from China.

Carpaccio, Vittore (c. 1465 - 1522), Italian painter. His distinguishing characteristics are natural expression, vivid conception, correct arrangement, and great variety of figures and costumes.

Carpathian Mountains, a range of mountains in Southern Europe, forming a great semicircular belt of nearly 800 miles in length. The Carpathian chain may be divided into two great sections—the West Carpathians, in Czechoslovakia, to the north-west, and the East Carpathians, which separate Transylvania and Romania proper, to the south-east, with lower ranges stretching between. To the Western Carpathians belongs the remarkable group of the Tatra, in which is situated the culminating summit of the system, the Gerlsdorf peak, rising to the height of 8721 feet. The only important rivers which actually rise in the chain are the Vistula, the Dniester, and the Theiss. The Carpathian range is rich in minerals, including gold, silver, quicksilver, copper, and iron. Salt occurs in beds, which have sometimes a thickness of 600 or 700 feet. On the plateaux corn and fruit are grown, to the height of 1500 feet. Higher up the mountain steepes are covered with forests of pine.—Cf. L. Phillimore, *In the Carpathians*.

Carpel, in botany, a single-celled ovary or seed-vessel, or a single cell of an ovary or seed-vessel, together with what belongs to that cell, as in many cases a separate style and stigma of the pistil. The pistil or fruit often consists of only one carpel, in which case it is called *simple*; when either consists of more than one carpel,

it is called *compound*. A carpel is regarded as a modified leaf.

Carpentaria, Gulf of, a large gulf on the north coast of Australia, having Cape York Peninsula, the northern extremity of Queensland, on the east, and Arnhem Land on the west.

Carpenter, William Benjamin (1813–1885), English physiologist. He wrote several well-known works on physiology: *Principles of General and Comparative Physiology*, *Principles of Mental Physiology*, *Principles of Human Physiology*, *A Manual of Zoology*, &c. He took a leading part in the expeditions sent out by Government between 1868 and 1870 for deep-sea exploration in the North Atlantic. He was chosen president of the British Association at Brighton in 1872.

Carpenter-bee, the common name of the different species of hymenopterous insects of the genus *Xylocopa*. The species are numerous in Asia, Africa, and America, and one species inhabits the south of Europe. They are generally of a dark violet-blue, and of considerable size.

Carpentras, a town, Southern France, department of Vaucluse. It is an ancient town, and has a Roman triumphal arch, an aqueduct, &c. Pop. 11,390.

Carpet, a thick fabric, generally composed wholly or principally of wool, for covering the floors of apartments, staircases, and passages in the interior of a house. Carpets were originally introduced from the East, where they were fabricated in pieces, like the modern rugs, for sitting on. The Persian, Turkish, and Indian carpets are all woven by hand, and the design is formed by knotting into the warp tufts of woollen threads of the proper colour one after the other. The *Brussels* carpet is composed of linen thread and worsted, the latter forming the pattern. The linen basis does not appear on the surface, being concealed by the worsted, which is drawn through the reticulations and looped over wires that are afterwards withdrawn, giving the surface a ribbed appearance. *Wilton* carpets are similar to Brussels in process of manufacture, but in them the loops are cut open, and the surface thus gets a pile. *Tapestry* carpets have also a pile surface. The *Kidderminster* or *Scotch* carpet consists of two distinct webs woven at the same time and knitted together by the woof. The pattern is the same on both sides of the cloth, but

the colours are reversed. The original *Axminster* carpets were made on the principle of the Persian or Turkey carpets. Patent Axminster carpets have a fine pile, which is produced by using chenille as the weft, the projecting threads of which form the pile, which is dyed before being used. Carpets of felted wool, with designs printed on them, are also used, and are very cheap. Cheap jute carpets are also made.

Carpi, a town of Northern Italy, 9 miles north of Modena. It is the centre of a fertile agricultural district. Pop. 8000.

Carracci, Ludovico, Agostino, and Annibale, the three founders of the Bologna, or eclectic school of painting. —Ludovico (1555–1619) left many works, the finest of which, such as *The Transfiguration* and *The Birth of St. John the Baptist*, are in the Pinacoteca at Bologna. *Susannah and the Elders* is at the National Gallery, London. —Agostino (1558–1601) engraved more pieces than he painted, though some of his pictures were admired by contemporaries even more than those of his brother Annibale. —Annibale (1600–1609) painted a series of frescoes for the Farnese Palace at Rome, which occupied him for eight years. He is generally considered the greatest of the Carracci.

Carrageen, or **Carragheen**, *Chondrus crispus*, a red seaweed very common on rocks and stones on every part of the coast of Britain. When dried it becomes whitish, and is used for making soups, jellies, size, &c.

Carranza, Venustiano (1859–1920), Mexican general and statesman. When Madero was assassinated in 1913, Carranza opposed the new President, Huerta, and organized a revolution. In Oct., 1915, Carranza was recognized by President Wilson, and soon afterwards by Great Britain and other European Powers, as President of Mexico. In April, 1920, a revolution broke out in Mexico, and Carranza was killed.

Carrara, a city of Northern Italy, 59 miles south-west of Modena, a few miles from the coast. It is surrounded by hills which contain fine white statuary marble, in the preparation of which and commoner sorts most of the inhabitants are occupied. Pop. (commune), 49,492.

Carrel, Armand (1800–1836), French Republican writer. In 1830 he united with Thiers and Mignet in editing the *National*,

which soon rose to be the leading newspaper in opposition to the Government of Charles X. In 1832 the *National* became openly Republican, and enjoyed great popularity. Carrel was killed in a duel.

Carrick, the southern district of the county of Ayr, Scotland. The Prince of Wales bears the title of Earl of Carrick.

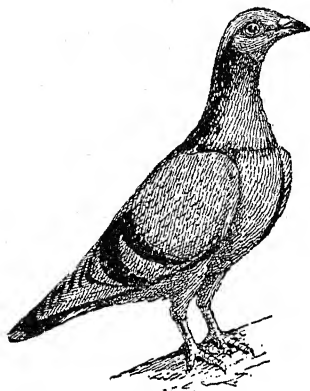
Carrickfergus, a seaport of Ireland, County Antrim. It is memorable as the landing-place of King William III, 14th June, 1690. There are some manufactures, principally linen, and extensive fisheries. The harbour, which is tidal, has a depth alongside quays of 13 feet at high-water. Pop. (1926) 4751.

Carrick-on-Suir, a town, Ireland, County Tipperary, on the Suir, navigable here by small vessels; it has a trade in agricultural produce. Pop. (1926), 4675.

Carrier, Jean Baptiste (1746-1794), infamous French revolutionist. In Oct., 1793, he was sent to Nantes to suppress the civil war and the uprising of La Vendée. He lessened the 'useless mouths' by wholesale massacres, carried out by means of perforated boats and shooting without trial. He originated that form of death by drowning that was known as a 'republican marriage'. He was recalled and guillotined.

Carrier Pigeon, a variety of the common domestic pigeon used for the purpose of carrying messages. Several varieties are thus employed, but what is distinctively called the carrier pigeon is a large bird with long wings, a large tuberculated mass of naked skin at the base of the beak, and with a circle of naked skin round the eyes. This variety, however, is rather a bird for show than use, and the variety generally employed to carry messages more resembles an ordinary pigeon. The practice of sending letters by pigeons belongs originally to Eastern countries, though in other countries it has often been adopted, more especially before the invention of the electric telegraph. An actual post-system in which pigeons were the messengers was established at Baghdad by the Sultan Nureddin Mahmud, who died in 1174, and lasted till 1258, when Baghdad fell into the hands of the Mongols and was destroyed by them. These birds can be utilized in this way only in virtue of what is called their 'homing' faculty, or instinct, which enables them to find their way back home from surprising

distances. But if they are taken to the place from which the message is to be sent and kept there too long, say over a fortnight, they will forget their home and not return to it. They are better to get some training by trying them first with short distances, which are then gradually increased. The missive may be fastened to the wing or the tail, and must be quite small and attached so as not to interfere with the bird's flight. By the use of microphotography a long message may be conveyed in this way, and such were received by the besieged residents in Paris during the Franco-Prussian War of 1870-1871, the birds



Carrier Pigeon

being conveyed out of the city in balloons. Seventy-two miles in two and a half hours, a hundred and eighty in four and a half, have been accomplished by carrier pigeons. Large numbers of these birds are now kept in England, Belgium, France, &c., there being numerous pigeon clubs which hold pigeon races to test the speed of the birds. During the European War (1914-1918), pigeons were employed to some extent by all sides with considerable success.

Carrington, Richard Christopher (1826-1875), British astronomer. In 1853 he erected an observatory at Redhill, Surrey, where he conducted valuable private investigations, especially on sun-spots and the elements of the sun's rotation. His works include: *Catalogue of 3735 Circumpolar Stars* (1857) and *Observations on the Spots on the Sun*.

Carrion-crow, in Britain the common crow (*Corvus corōnē*), so called because it often feeds on carrion. The name is often incorrectly applied to the gregarious rook (*C. frugilegus*). See *Crow*.

Carrion-flowers, a common name for species of the genus *Stapelia* (nat. ord. Asclepiadaceæ), so called because of their putrid odour, which attracts the fly by which cross-pollination is effected.

Carroll, Lewis, pen-name of the Rev. Charles Lutwidge Dodgson (1832–1898), poet, mathematician, and general writer. He held a mathematical lectureship at Christ Church, Oxford, and published several mathematical works. He did not, however, become known to the public at large until 1865, when he leapt into fame as the author of *Alice's Adventures in Wonderland*. Equally delightful is its sequel, *Through the Looking Glass and What Alice Found There* (1871). Among his other works are: *An Elementary Treatise on Determinants*, *Phantasmagoria and other Poems, Rhyme? and Reason?*, *Sylvie and Bruno*, and *Symbolic Logic*.

Carrot, a biennial umbelliferous plant, a native of Britain and other parts of Europe. The root in its wild state is small, but that of the cultivated variety is large, succulent, and of a red, yellow, or pale-straw colour. It is cultivated for the table and as a food for cattle. Carrots contain a large proportion of saccharine matter, and attempts have been made to extract sugar from them.

Carrot-fly, a minute fly which lays its eggs on the plant close to the ground. The maggots that hatch out attack the roots, causing them to become 'rusty' carrots.

Carson, Edward Henry, Baron (1854–), British statesman and lawyer. He acted as Solicitor-General for Ireland in 1892, and became Solicitor-General for England in 1900. A strong anti-Home Ruler, Carson became the head of the Ulster resistance to the Home Rule Bill for Ireland in 1912. He organized the Signing of the Covenant (28th Sept., 1912). He also played the most prominent part in organizing the Ulster Volunteer Force, but when war broke out he urged the members of this force to join the army, which most of them did, forming the celebrated 36th (Ulster) Division. During the European War he was Attorney-General (1915), First Lord of the Admir-

alty (1917), and Minister without Portfolio (1917–1918). He became a Lord of Appeal in 1921.

Carstairs, or **Carstares**, William (1649–1715), Scottish clergyman and politician. His scholarship, sagacity, and political information won for him the confidence of William of Orange, who planned the invasion of 1688 mainly by his advice. When William was settled on the throne, Carstairs was the chief agent between the Church of Scotland and the Court, and was instrumental in the establishment of Presbyterianism, to which William was averse. Owing to his authority in Church matters, he was nicknamed *Cardinal Carstairs*. Anne made him principal of the University of Edinburgh. —Cf. Rev. R. H. Story, *Character and Career of William Carstairs*.

Cartagena, a fortified seaport of Spain, in the province of Murcia, with a harbour which is one of the largest and safest in the Mediterranean, sheltered by lofty hills. The average depth of the harbour is 28 feet, and there is a large Government dry-dock. It is a naval and military station, with an arsenal, dockyards, &c. Lead-smelting is largely carried on; and there are in the neighbourhood rich mines of excellent iron. Esparto grass, lead, iron ore, oranges, &c., are exported. There is now a wireless station at Cartagena. Pop. 96,891.

Cartagena, a seaport, Republic of Colombia, on the Caribbean Sea, capital of the state of Bolivar, with a naval arsenal. The exports are coffee, cotton, timber, ivory-nuts, rubber, hides, &c. The trade, which had partly gone to Sabanilla and Santa Marta, is being again recovered since the reopening of the canal to the River Magdalena. The harbour has a depth of 25–40 ft. Pop. (1928), 86,467.

Cartago, a town of Central America, in Costa Rica. It formerly had a population of about 37,000, but was utterly ruined by an earthquake in connexion with an eruption of a neighbouring volcano in 1841, so that its population has decreased to 14,833 in 1927.

Cartago, a town in Colombia, in the valley of the Cauca, in a well-cultivated district and with a good trade. Pop. 10,000.

Carte, Thomas (1686–1754), English historian. In 1736 he published *Life of James, Duke of Ormonde* (2 vols. folio),

and between 1747 and 1752 three vols. of his voluminous *History of England*, a fourth being published in 1755.

Carter, Elizabeth (1717–1806), English translator. She was educated by her father, and learned Latin, Greek, French, German, Italian, Spanish, Portuguese, Hebrew, and Arabic. She wrote poems, translated the critique of Crousaz on Pope's *Essay on Man*, and Epictetus.

Carthage, the most famous city of Africa in antiquity, capital of a rich and powerful commercial republic. Carthage is supposed to have been founded by settlers from Tyre and from the neighbouring Utica about the middle of the ninth century before Christ. The story of Dido and the foundation of Carthage is mere legend or invention. The history of Carthage falls naturally into three epochs. The first, from the foundation to 410 B.C., comprises the rise and culmination of Carthaginian power; the second, from 410 to 265 B.C., is the period of the wars with the Sicilian Greeks; the third, from 265 to 146 B.C., the period of the wars with Rome, ending with the fall of Carthage.

The rise of Carthage may be attributed to the superiority of her site for commercial purposes, and the enterprise of her inhabitants, which soon acquired for her an ascendancy over the earlier Tyrian colonies in the district, Utica, Tunis, Hippo, Septis, and Hadrumetum. Her relations with the native populations, Libyans and nomads, were those of a superior with inferior races. Some of them were directly subject to Carthage, others contributed large sums as tribute, and Libyans formed the main body of infantry as nomads did of cavalry in the Carthaginian army. Besides these there were native Carthaginian colonies, small centres and supports for her great commercial system, sprinkled along the whole northern coast of Africa, from Cyrenaica on the east to the Straits of Gibraltar on the west.

In extending her commerce Carthage was naturally led to the conquest of the various islands which from their position might serve as entrepôts for traffic with the northern shores of the Mediterranean. Sardinia was the first conquest of the Carthaginians, and its capital, Caralis, now Cagliari, was founded by them. Soon after they occupied Corsica, the Balearic,

and many smaller islands in the Mediterranean. When the Persians under Xerxes invaded Greece, the Carthaginians, who had already several settlements in the west of Sicily, co-operated by organizing a great expedition of 300,000 men against the Greek cities in Sicily. But the defeat of the Carthaginians at Himera by the Greeks under Gelon of Syracuse effectually checked their further progress (480 B.C.). The war with the Greeks in Sicily was not renewed till 410. Hannibal, the son of Gisco, invaded Sicily, reduced first Selinus and Himera, and then Agrigentum. Syracuse itself was only saved a little later by a pestilence which enfeebled the army of Himilco (396). The struggle between the Greeks and the Carthaginians continued at intervals with varying success, its most remarkable events being the military successes of the Corinthian Timoleon (345–340) at Syracuse, and the invasion of the Carthaginian territory in Africa by Agathocles (310 B.C.). After the death of Agathocles the Greeks called in Pyrrhus, King of Epirus, to their aid, but notwithstanding numerous defeats (277–275 B.C.), the Carthaginians seemed, after the departure of Pyrrhus, to have the conquest of all Sicily at length within their power. The intervention of the Romans was at last invoked, and with their invasion (264 B.C.) the third period of Carthaginian history begins. The First Punic War (Lat. *Punicus*, Phœnician), in which Rome and Carthage contended for the dominion of Sicily, was prolonged for twenty-three years (264–241 B.C.), and ended, through the exhaustion of the resources of Carthage, in her expulsion from the island. The loss of Sicily led to the acquisition of Spain for Carthage, which was almost solely the work of Hamilcar and Hasdrubal. The Second Punic War, arising out of incidents connected with the Carthaginian conquests in Spain, and conducted on the side of the Carthaginians by the genius of Hannibal, and distinguished by his great march on Rome and the victories of Lake Trasimene, Trebia, and Cannæ, lasted seventeen years (218–201 B.C.), and after just missing the overthrow of Rome, ended in the complete humiliation of Carthage. (See *Rome*; *Hannibal*.) The policy of Rome in encouraging the African enemies of Carthage occasioned the Third Punic War, in which Rome was the aggressor. This war, begun

149 B.C., ended 146 B.C. in the total destruction of Carthage.

The Constitution of Carthage, like her history, remains in many points obscure. The name of king occurs in the Greek accounts of it, but the monarchical Constitution, as commonly understood, never appears to have existed in Carthage. The officers called kings by the Greeks were two in number, the heads of an oligarchical republic, and were otherwise called Suffetes, the original name being considered identical with the Heb. *Shofetim*, judges. These officers were chosen from the principal families, and were elected annually. There was a Senate of 300, and a smaller body of thirty chosen from the Senate, sometimes another smaller council of ten. In its later ages the state was divided by bitter factions, and liable to violent popular tumults. After the destruction of Carthage her territory became the Roman province of Africa. Twenty-four years after her fall an unsuccessful attempt was made to rebuild Carthage by Gaius Gracchus. This was finally accomplished by Augustus, and Roman Carthage became one of the most important cities of the Empire. It was taken and destroyed by the Arabs in 638. The religion of the Carthaginians was that of their Phœnician ancestors. They worshipped Moloch or Baal, to whom they offered human sacrifices; Melkart, the patron deity of Tyre; Astarte, the Phœnician Venus, and other deities, who were mostly propitiated by cruel or lascivious rites.—BIBLIOGRAPHY: N. Davis, *Carthage and her Remains*; R. B. Smith, *Carthage and the Carthaginians*; Mabel Moore, *Carthage of the Phœnicians in the Light of Modern Excavation*.

Carthage, a town of the U.S.A., in the south-west of Missouri, in a region rich in lead and zinc; an important railway junction. Pop. 9483.

Carthusians, a religious order instituted by St. Bruno (q.v.), who, about 1084, built several hermitages 4 leagues from Grenoble in South-East France, and, with six companions, united the ascetic with the monastic life. They practised the greatest abstinence, wore coarse garments, and ate only vegetables and the coarsest bread. From their original seat (*La Chartreuse*) they were called *Carthusians*. Their fifth general, Guigo (died 1137), prescribed, besides the

usual monastic vows, eternal silence and solitude. In the following centuries they received additional statutes, which forbade altogether the eating of flesh, and allowed them to speak only during certain hours on Thursdays and the days on which the chapter met. Their habit is a hair-cloth shirt, a white tunic, a black cloak, and a cowl.

Cartier, Sir Georges Étienne (1814–1873), Canadian statesman. In 1858 he became Premier, remaining in this position till 1862. He was active in bringing about the establishment of the Dominion of Canada in 1867, and held a post in the first Dominion Cabinet.

Cartier, Jacques (1494–1557), French navigator. He commanded an expedition to North America in 1534, and took possession of the mainland of Canada in the name of Francis I.

Cartilage. See *Histology*.

Cartography, the constructing of maps of the globe's surface, or portions thereof. Maps are of different kinds, according to the purpose in view, e.g. *political* maps, where countries, towns, &c., are shown; *physical*, representing natural features; *orographical*, exhibiting specially the diversities of surface level. Variation of level may be depicted in relief, on a scale much larger than that adopted for the horizontal lengths, or may be indicated by different tints or shading, by hatching or 'hachures', or by curves (contour-lines) connecting places of certain definite altitudes. See *Map*; *Surveying*.

Cartoon, in painting, a drawing on stout paper or other material, intended to be used as a model for a large picture in fresco, a process in which it is necessary to complete the picture portion by portion and in which a fault cannot afterwards be easily corrected. The cartoon is made exactly the size of the picture intended, and the design is transferred to the surface to be ornamented by tracing or other processes. The most famous cartoons are those painted by Raphael for the Vatican tapestries, seven of which are still preserved in the South Kensington Museum, London.

Cartridge, the ammunition used in modern small-arms, quick-firing guns, and sporting weapons. The two main portions of a military cartridge are the case and the projectile. The 'case' is of brass, and contains the explosive material; in its

base is the 'cap', consisting of a composition of fulminate of mercury, which, being operated on by the 'striker', explodes the 'charge'. Between the charge and the bullet is a cardboard wad. Cartridges for use in shot-guns are slightly different in that both charge and shot are completely enclosed in the case, which is a perfect cylinder closed with a wad. Such cases are made either of brass or of thick paper with a brass base.

Cartwright, Edmund (1743–1823), English inventor. In 1785 he brought his first power-loom into action. Although much opposed both by manufacturers and workmen, it made its way, and in a developed and improved form is now in universal use.

Cartwright, Thomas (1535–1603), one of the eminent Puritan divines of the sixteenth century. He was at one time professor of divinity at Cambridge.

Carupano, a seaport of Venezuela, on the peninsula of Paria. There is a trade in coffee, sugar, and rum. Pop. 13,000.

Caruso, Enrico (1873–1921), Italian singer. He obtained his first great success in *La Traviata* (Naples, 1896). In 1898 he appeared at Milan in *La Bohème*, and became known as one of the foremost singers in the world, his principal rôles being Des Grieux in *Manon Lescaut*, the Duke in *Rigoletto*, &c.

Carvin, a town of France, department of Pas-de-Calais; industries: coal-mining, iron-founding, distilling, beet-root sugar, and flax-spinning. Pop. 9480.

Cary, Henry Francis (1772–1844), English translator. He is chiefly remembered for having written the standard translation of Dante in English blank verse (completed 1814).

Caryophyllaceæ, an order of plants, of which the pink, *Dianthus*, may be considered as the type. Chick-weed, sandwort, carnation, sweet-william, &c., belong to the order.

Casablanca, a seaport on the Atlantic coast of Morocco, exporting peas, lentils, beans, barley, eggs, and phosphates. The port has been greatly improved by the construction of breakwaters, and has now accommodation for large vessels. Pop. (1926), 106,608.

Casale, a strongly fortified city of Northern Italy, province of Alessandria, on the Po. Silk weaving is the chief industry. Pop. 20,000.

Casanova, Giovanni Jacopo, de Seingalt (1725–1798), Italian adventurer. He was in turn diplomatist, preacher, abbot, lawyer, and charlatan. His celebrated *Memoirs* are a lively picture of the manners of his times, but are probably not very veracious.

Casaubon, Isaac de (1559–1614), French (naturalized English) classical scholar. In 1582 he became professor of the Greek language at Geneva. Henry IV invited him to Paris and made him royal librarian. After the death of Henry IV he went to England, where he was received with distinction. Casaubon was a man of extensive learning, and an excellent critic of the ancient classics, many of which he edited. His *Life* was written by M. Pattison (1875).

Cascade Range, a range of mountains in North America, near the Pacific coast, to which they are parallel, extending from the Sierra Nevada in California northwards to Alaska. It contains several active volcanoes. Highest peak, Mount St. Elias, 18,017 feet. The highest peaks in the United States portion of it are in Washington territory, where Mount Rainier or Tacoma reaches 14,408 feet, St. Helens 10,000 feet, and Mount Adams, 12,807 feet.

Cascara Sagrada, the dried bark of a kind of North American buckthorn, from which a mild laxative is prepared.

Cascarilla, the aromatic bitter bark of *Croton Eleutheria*, a small tree of the nat. ord. Euphorbiaceæ.

Casco Bay, a bay of America, in Maine, United States, between Cape Elizabeth on w.s.w. and Cape Small Point on e.n.e. Within these capes are more than 300 small islands, most of them very productive.

Case-hardening is a process by which mild steel is superficially converted into hard steel. The articles of mild steel are placed in an iron box, with carbonaceous matter, and heated to redness. After cooling, they are reheated and quenched in water.

Casein, that ingredient in milk which is coagulated spontaneously by the action of acids alone, and constitutes the chief part of the nitrogenized matter contained in it. It consists of carbon, 53.13 per cent; hydrogen, 7.06; nitrogen, 15.78; oxygen, 22.40; sulphur, 0.77; and phosphorus, 0.86.

Casement, Roger (1864-1916), Irish conspirator. He was engaged in the British consular service from 1895 to 1913, and was knighted in 1911. In 1912, while Consul-General at Rio de Janeiro, he became quite famous for his investigations of the cruelties practised on natives in Putumayo by a British rubber company. During the European War he went over to Germany and tried to persuade the Irish prisoners of war to join the German armies, but met with very little success. During the night of 20th April, 1916, an attempt was made to land arms and ammunition in Ireland by a vessel disguised as a neutral merchant ship, in reality, however, a German auxiliary. The vessel was sunk and many prisoners were made; among these was Casement. He was degraded from the rank of knight-bachelor, and was convicted of high treason and sentenced to death. He was hanged in Pentonville Jail on 3rd Aug., 1916.

Caserta, a town and episcopal see of Campania, Italy, in the province of Naples, about 20 miles N.E. of Naples. The principal edifice is the royal palace. There are large silk-factories at St. Leucio, 2 miles north. Pop. 35,172.

Cash Credit, or **Cash Account**, a mode of advancing funds originated by the Scottish banks, and since adopted by others. A cash credit is an account which the trader may overdraw to a certain amount as he may require, paying cash in and taking it out according to his needs within that limit. Heritable property, two sureties, or some other form of security is usually demanded by the bank.

Cashel, a town, Irish Free State, County Tipperary, with interesting ruins. Cashel was the seat of the ancient kings of Munster. Pop. 2813.

Cashew, a tree of the order Anacardiaceae, common in the West Indies. The cashew-nut is small, kidney-shaped, ash-grey, and contains an acrid juice. After roasting it is good to eat.

Casimir III, the Great (1309-1370), King of Poland. He ascended the throne in 1333, conquered Little Russia, Silesia, and repelled the Tatars.

Casimir-Périer, Jean Paul Pierre (1847-1907), President of the French Republic. In 1893 he became President of the Chamber of Deputies, and on 3rd Dec. President of the Council and Prime Minister. On 22nd May, 1894, after the

assassination of President Carnot, he was elected President of the Republic, but resigned on 15th Jan., 1895.

Caslav, a town, Bohemia, Czechoslovakia. It is an important railway terminus. Pop. 10,000.

Caspian Sea, a large inland sea between Europe and Asia, 730 miles in length, and from 130 to 270 miles in breadth; area, 170,000 sq. miles; the largest isolated sheet of water on the globe. Its surface is 85 feet below that of the Sea of Azov; greatest depth, about 3250 feet. Russian territory surrounds it on three sides, Persia on the fourth. It abounds in shallows, making navigation difficult. Among the rivers which flow into it are the Volga, Ural, Terek, and Kur. It has no outlet. The water is less salt than that of the ocean, of a bitter taste, and of an ochre colour, without ebb or flow. The fisheries are valuable, including those of sturgeon, sterlet, roach, bream, perch, carp, and porpoises. The only ports at all worthy the name on or near the Caspian are Astrakhan, Derbent, Baku, Krasnovodsk, and Asterabad. Steam-vessels have long been plying on it. The Russians have also a naphtha flotilla in the Caspian. By the Volga and canals there is water communication with the Baltic. In 1928 the construction was begun of a railway from Bandar-i-Gaz on Asterabad Bay in the Caspian, through Tehran, Kazvin, and Hamadan to Khor Musa on the Persian Gulf (1600 miles in all).

Cass, Lewis (1782-1866), American politician. He was Governor of Michigan from 1814 to 1830, Minister of War in 1831, and from 1857 to 1860 Secretary of State. He wrote *Inquiries concerning the History, Traditions, and Languages of Indians Living within the United States*.

Cassandra (c. 354-297 B.C.), King of Macedonia. He put to death the mother, the wife, and the son of Alexander the Great to make way for himself to the throne. After the defeat of Antigonus (301 B.C.), he became undisputed sovereign of Macedonia.

Cassandra, in Greek legend, a daughter of Priam and Hecuba. She was endowed by Apollo with the gift of prophecy, coupled with this disadvantage, that her prophecies should never be believed. When Troy was taken, she fell, as part of his share of the booty, to Agamemnon, who carried her to Mycenæ, where they

were both murdered by Clytemnestra.

Cassano, two towns in Italy.—(1) A town, province of Cosenza, the seat of a bishopric. It has hot sulphurous springs. Pop. 8552.—(2) *Cassano d'Adda*, a town 16 miles N.N.E. of Milan. It has manufactures of silk. Pop. (commune), 9150.

Cassation, a term used in the courts on the continent of Europe, signifying the annulling of any act or decision, if the forms prescribed by law have been neglected, or if anything is contained in it contrary to law.—*Court of Cassation*, one of the most important institutions of modern France, established by the first National Assembly in 1790. The sphere of this court is to decide on the competency of the other courts, and on the petitions to have their decisions reviewed or annulled.

Cassava (*Manihot utilissima*), a South American shrub, about 8 feet in height, with broad, shining, and somewhat hand-shaped leaves, and beautiful white and

powerful pressure to express the juice, which is highly poisonous in its natural state. The flour that remains after pressing is formed into cakes, and baked on a hot iron plate. In this state it forms a valuable article of food, upon which many of the inhabitants of Southern America live almost entirely. From cassava the tapioca of commerce is prepared. Another species (*M. Aipi*), the sweet cassava, has roots the juice of which is not poisonous, and which are an agreeable and nutritive food.

Cassel, the chief town in the province of Hesse-Nassau, Prussia, on the Fulda. The Old and New Towns are connected by a bridge over the Fulda. The city has manufactures of machinery, mathematical instruments, gold and silver wares, chemicals, knives, gloves, leather, porcelain, &c. Pop. (1925), 171,661.

Cassia, a large tropical genus of Leguminosæ, sub-order Cæsalpineæ. The species consist of trees, shrubs, or herbs; the leaves are abruptly pinnated, and usually bear glands on their stalks. The leaflets of several species constitute the well-known drug called senna (q.v.). The leaves and flowers are also purgative. The bark and roots of several of the Indian species are much used in medicine. *Cassia bark* is a common name for the bark of an entirely different plant, *Cinnamomum cassia*, belonging to the laurel family. Its flavour somewhat resembles that of cinnamon, and as it is cheaper it is often substituted for it, but more particularly for the preparation of what is called oil of cinnamon.

Cassini, a name famous in astronomy and physics for three generations.—(1) Giovanni Domenico (1625–1712) discovered four new satellites of Saturn, proved that the axis of the moon is not perpendicular to the plane of the ecliptic, and showed the causes of her libration. *Cassini's oval* is named after him.—(2) Jacques (1677–1756), his son, completed his work on Saturn's satellites and ring.—(3) Cassini de Thury, César François (1714–1784), son of the preceding, undertook a geometrical survey of France.—(4) Cassini, Jean Dominique, Comte de Thury (1748–1845), son of the preceding, was a statesman of ability as well as a mathematician.

Cassino, a town of Italy, province of Caserta, on the railway from Rome to Naples, with remains of the ancient town



Cassava (*Manihot utilissima*)

rose-coloured flowers, belonging to the nat. ord. Euphorbiacæ, sub-order Crotonæ. A nutritious starch is obtained from the white soft root of the plant, and is called by the same name. It is prepared in the West Indies, tropical America, and in Africa in the following manner: The roots are washed, stripped of their rind, and grated down to a pulp, which is put into coarse, strong canvas bags, and submitted to

Casinum, and the famous ancient monastery Monte-Cassino (q.v.) on a neighbouring hill. Pop. 14,500.

Cassiodorus, Magnus Aurelius, Roman writer, born in the latter half of the fifth century A.D. He became chief minister of the Ostrogoth King Theodoric, and wrote a collection of letters, *Variarum Epistolarum Libri XII*.

Cassiquiare, a large river of South America, in Venezuela, which branches off from the Orinoco and joins the Rio Negro. By means of this river water communication is established for canoes over an immense tract of South America.

Cassiterides, a name applied to the places from which the Phœnicians are supposed to have derived their tin. The location of these places has never been fixed, and the name has been variously applied to the Balearic Islands, to the Scilly Isles, to Cornwall, and to the Hebrides.

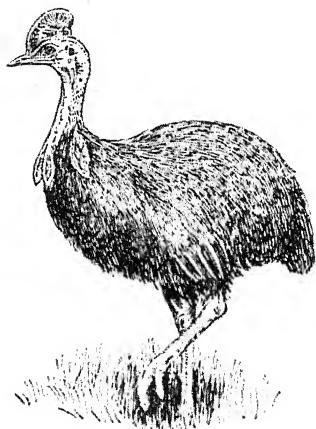
Cassiterite, a hard mineral, usually dark-brown and almost black, with a high lustre, composed of tin dioxide (tin, 79 per cent). It is the one important ore of the metal, and occurs mostly in veins in granites that have been altered by subterranean vapours.

Cassius (Gaius Cassius Longinus) (d. 42 B.C.), Roman conspirator. He was the prime mover in the assassination of Julius Cæsar in 44 B.C. Afterwards he and Brutus raised an army, but they were met by Octavianus and Antony at Philippi. The wing which Cassius commanded being defeated, he killed himself.

Cassivellaunus, a British chief who, when Cæsar invaded Britain, held sway over the tribes living to the north of the Thames. He had at first some slight successes, but in the end sued for peace, which was granted on condition that he should pay a yearly tribute and give hostages.

Cassowary, one of the running birds (Ratitæ) belonging to the Australian region. The family (Casuariidæ) includes two genera—*Casuarus*, or cassowary proper, and *Dromæus*, the emu. Several species of both genera are known, and of these the most familiar is the helmeted cassowary (*C. galeatus*), so called from its head being surmounted by an osseous prominence, covered with a sort of horny helmet. The cassowary feeds on fruits, eggs of birds, &c., and bolts its food with

great voracity. It is a native of the Island of Ceram. Of the other nine species one inhabits Australia and five New Guinea,



Helmeted Cassowary (*Casuarus galeatus*)

the rest the adjacent islands. They inhabit thick forests and scrub, and run with great rapidity.

Castalia, a fountain in Greece sacred to Apollo and the Muses, and said to have the power of inspiring those who drank its waters.

Caste, a term applied to a distinct class or section of a people marked off from others by certain restrictions, whose burdens or privileges are hereditary. It now prevails principally in India, but it is known to exist or have existed in many other regions. Some maintain that it was prevalent in ancient Egypt, but this seems uncertain. Social distinctions exist amongst all nations, but nowhere are they so rigidly observed as amongst the Hindus. See *Hinduism*.—**BIBLIOGRAPHY**: Sir H. H. Risley, *Tribes and Castes of Bengal*; A. C. Lyall, *Asiatic Studies*; Sir Sidney Low, *Vision of India*.

Castelar y Ripoll, Emilio (1832-1899), Spanish politician and author. In 1873 he was elected President of the republican Cortes, but resigned in Jan., 1874. After the *pronunciamiento* in favour of Alphonso XII, 13th Dec., 1874, Castelar retired from Spain, but in a year or two returned, and again sat in the Cortes. He published many novels, poems, and popular works.

Castel-Franco, a fortified town in North Italy, in the province of Treviso. It is an important railway junction. Pop. 14,825.

Castellammare.—(1) A seaport of Italy, on the Gulf of Naples. It is fortified, and has a royal dockyard, and manufactories of cottons and silk. Pop. 33,579.—(2) A seaport on the north coast of Sicily. Wine, fruit, grain, and oil are exported. Pop. 17,367.

Castellana, a town of Southern Italy, province of Bari. Pop. 11,510.

Castellaneta, a cathedral town of Southern Italy, 18 miles north-west of Tarentum. Cotton is extensively grown in the vicinity. Pop. 11,533.

Castello Branco, an episcopal city of Portugal, province of Beira. It manufactures woollens, and trades in wine, oil, and cork. Pop. 10,486.

Castellon-de-la-Plana, a town, Spain, capital of the province of Castellon, in a large and fertile plain, with manufactures of sailcloth, woollen and hempen fabrics, ropes, paper, soap, &c., and some trade in hemp, grain, and fruit. Pop. of town, 34,981; of province, 311,196; area of latter, 2495 sq. miles.

Castelnau, Marie Joseph Edouard de Curières de (1851–), French soldier. In 1914 he commanded the Second French Army, became Chief of the General Staff in 1915, and went to Salonica in December of the same year. He was in command of the French armies at Verdun and Lorraine, and after the war represented Aveyron in the *Chamber of Deputies*.

Castelnaudary, a town of Southern France, department of Aude, with manufactures of cloth, linen, and earthenware, distilleries and tanneries, and a good trade. Pop. 6000.

Castel-Vetrano, a town, Sicily, province of Trapani, on a rocky hill; industries: silk, linen, and cotton. The white wine produced in the neighbourhood is esteemed the best in Sicily. Pop. 24,674.

Casti, Giambatista (1721–1803), Italian poet. The *Novelle Galanti*, a series of tales; the *Animali Parlanti*, an epic poem; and his comic operas are amongst his chief works.

Castiglione, Baldassare (1478–1529), Italian man of letters. Among his works the *Libro del Cortegiano* (Book of the Courtier) is the most celebrated.

Castiglione, a town in Sicily, province

of Catania, noted for filberts and wine. Pop. 14,308.

Castile, an ancient kingdom of Spain, the nucleus of the Spanish monarchy, extends over a large part of the peninsula from the Bay of Biscay southward, occupying an area of about 53,500 sq. miles. It is divided into *New Castile* and *Old Castile*. The former occupies the centre of the peninsula; area, 28,016 sq. miles. It is traversed from east to west by three lofty mountain chains, nearly parallel to each other—the Sierra Guadarrama, the mountains of Toledo and Sierra Molina, and the Sierra Morena. Between these chains, which form the great watersheds of the province, lie two extensive plains or plateaux, almost without wood, and arid and barren in appearance. Dryness, indeed, is the curse of the whole country, and there is a great deficiency of method alike in agriculture and industries. Pop. 1,923,310.—*Old Castile* stretches from the Bay of Biscay to New Castile; area, 25,408 sq. miles. It is traversed by three mountain chains—the Sierra de Guadarrama, the Sierra de Deza, and the Cantabrian Mountains. It is less dry than New Castile, and grain, particularly wheat, is raised in great abundance. The pastures both of the mountains and the plains are excellent, and much merino wool is produced. Pop. 1,720,000.

Castillejo, Cristoval de (1494–1556), Spanish poet. He was the last representative of the old Spanish court poetry, and strenuously opposed Boscan and Garcilaso in introducing the classical Italian forms of literature.

Castling. See *Founding*.

Castle-Douglas, a burgh of Scotland, Kirkcudbrightshire, a railway junction, with important sales of sheep and cattle. Pop. (1931), 3008.

Castleford, town, Yorkshire, W. Riding, with glassworks. Pop. (1931), 21,781.

Castlemaine, a town in Talbot county, Victoria, Australia. It owes its importance to the gold-mining and agriculture carried on in its neighbourhood. Pop. 7169.

Castlereagh, Lord. See *Londonderry*.

Castor and Pollux, in Greek mythology, the heavenly twins, sons of Tyn-dareus, King of Lacedæmon, and Leda, or, according to a later tradition, the sons of Zeus (Jupiter) and Leda. Castor was mortal, but Pollux was immortal.

Castor-oil, the oil obtained from the

seeds of *Ricinus communis*, a native of India, but now grown in almost all tropical countries. It is an almost colourless, odourless, but not tasteless liquid, and is the most valuable laxative in medicine. It is much used for children and delicate people, where only a mild, safe purgative is required, and is supposed to be best administered in milk. Drops of castor-oil are poured into the eye to remove irrita-



Castor-oil Plant (*Ricinus communis*)

tion caused by the removal of foreign bodies. The oil is extensively prepared in Italy, Marseille, Hull, and London.

Castren, Matthias Alexander (1813-1852), Finnish philologist. Among his works are a Swedish translation of the great Finnish epic *The Kalevala*. He also wrote: *Elementa Grammatices Syriacæ*, *Elementa Grammatices Tscheremissæ*, *De affinis personalibus linguarum Altaicarum*, besides travels and other works.

Castres, a town of Southern France, department of Tarn, on the Agout, which divides it into two parts. There are tanneries, paper-mills, foundries, &c., and manufactures of woollen goods, linen, glue, &c. Pop. 27,830.

Castries, chief town of St. Lucia, Windward Islands. It has a Government lime-juice factory, and is one of the safest

harbours in the West Indies. It is a coaling and naval station, and exports sugar, cotton, coffee, rum, honey, and lime-juice. Pop. 5899.

Castro-del-Rio, a town, Spain, Andalusia, in the province of Cordova. There are manufactures of linen, woollen goods, and earthenware. Pop. 15,000.

Castrogiovanni, a town, Sicily, province of Caltanissetta, near the centre of the island, on a high tableland. Sulphur is obtained in the district. Pop. 28,932.

Castro Urdiales, a seaport of Northern Spain, province of Santander, a place of export for iron ore, sardines, &c. Pop. 15,000.

Casuarina, the single genus of the nat. ord. of Casuarinaceæ, or cassowary trees. There are about thirty species, natives chiefly of Australia. Some of them produce timber called *Beefwood* from its colour.

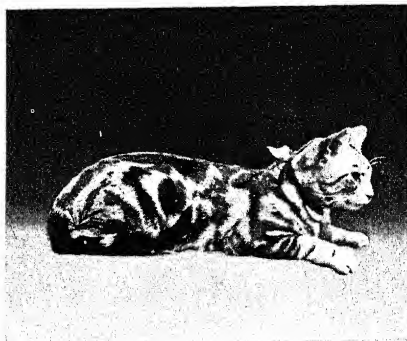
Casuistry has been rightly defined as 'a particular development of accommodation in religious matters'. There have been many celebrated casuists among the Jesuits—for example, Escobar y Mendoza (1589-1669), Sanchez, Hermann Busenbaum, Paul Laymann, and V. Figliucci (1566-1622)—famous for their ingenuity and the fine-spun sophistry of their solutions. In his famous *Lettres Provinciales*, Pascal dealt with the Casuists and the artificiality of their methods.

Cat, the name given to a family of Carnivora (Felidæ) which includes the lion, tiger, puma, wild cat, &c., and more particularly applied to the domestic cat. It is believed that the cat was originally domesticated in Egypt, and the gloved cat (*Felis maniculata*) of Egypt and Nubia has by some been considered the original stock of the domestic cat, though more probably it was the Egyptian cat (*F. caligata*). The Egyptians regarded the cat as a sacred animal, the mummified remains of many of these animals being still in existence. It was seldom, if at all, kept by the Greeks and Romans, and till long after the Christian era was rare in many parts of Europe. Some have thought that the domestic breed owed its origin to the wild cat; but there are considerable differences between them, the latter being larger, and having a shorter and thicker tail, which also does not taper. The domestic cat belongs to a genus—that which contains the lion and tiger—

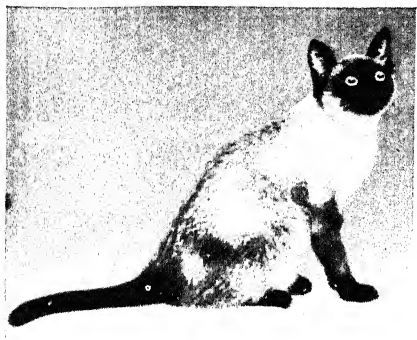
DOMESTIC CATS



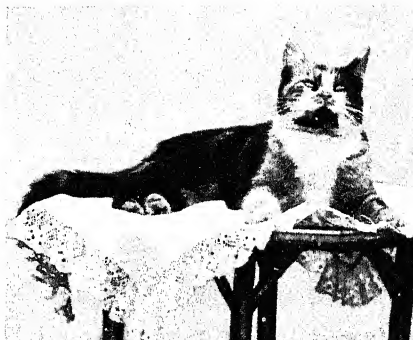
Blue Persian



Silver Tabby



Siamese



Tortoiseshell and White

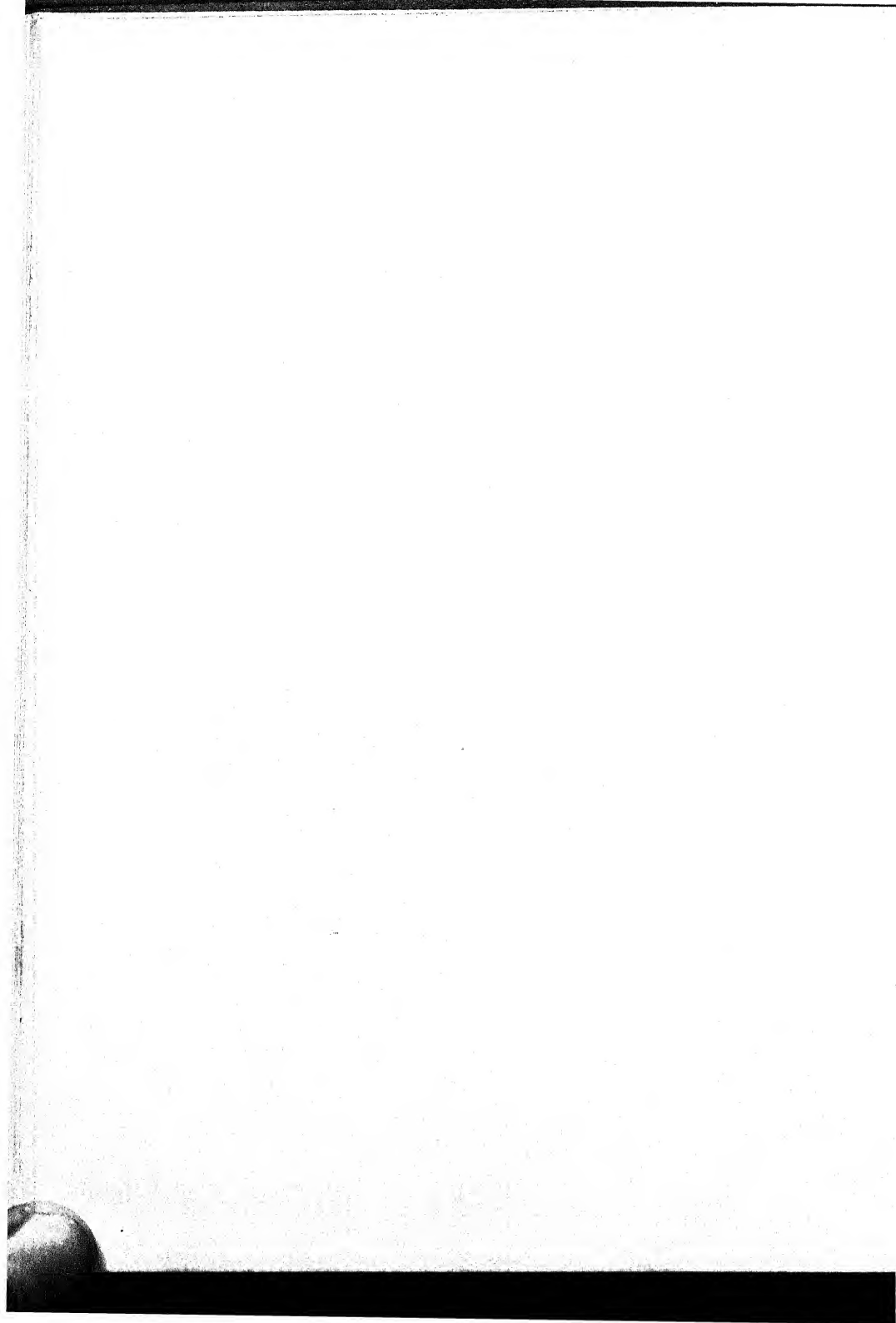


Manx



Brown Tabby

Photographs by Sport and General



better armed for the destruction of animal life than any other quadrupeds. It has short and powerful jaws, trenchant teeth, cunning disposition, combined with nocturnal habits (for which their eyesight is naturally adapted) and much patience in pursuit. Its food is usually flesh or fish. It is a clean animal, and looks after its fur carefully. The cat goes with young for sixty-three days, and brings forth usually from three to six at a litter, which remain blind for nine days. Among the various breeds or races of cat may be mentioned the tortoise-shell, with its colour a mixture of black, white, and brownish or fawn colour; the large Angora or Persian cat, with its long silky fur; the blue or Carthusian, with long, soft, greyish-blue fur; and the tailless cat of the Isle of Man (the Manx).—The wild cat (*Felis catus*) is still found in Scotland and in various other parts of Europe and Western Asia, chiefly in forest regions, making its lair in hollow trees or clefts of rocks. It is a very fierce animal.

Catacombs, caves or subterranean places for the burial of the dead, the bodies being placed in graves or recesses hollowed

&c. In Asia Minor numerous excavations have been discovered containing sepulchres, and the catacombs near Naples are remarkably extensive. Those of Rome, however, are the most important. They extend underneath the city itself as well as the neighbouring country, and are said to contain no fewer than 6,000,000 tombs. They consist of long narrow galleries usually about 8 feet high and 5 feet wide, which branch off in all directions, forming a perfect maze of corridors. Different stories of galleries lie one below the other. Vertical shafts run up to the outer air, thus introducing light and air, though in small quantity. The graves or *loculi* lie longwise in the galleries. They are closed laterally by a slab, on which there is occasionally a brief inscription or a symbol, such as a dove, an anchor, or a palm-branch. These inscriptions and paintings constitute precious monuments of early Christian epigraphy. The earliest that can be dated with any certainty belongs to the year A.D. 111. During the siege of Rome by the Lombards in the eighth century the catacombs were in part destroyed, and soon became entirely inaccessible, so that by the twelfth century they were forgotten. It was not until the publication of *Roma Sotterranea Cristiana* by A. Bosio (1632) that attention was called to the catacombs. The real discoverer of the catacombs, however, was Giovanni Battista de Rossi (*La Roma Sotterranea*, 1864–1877). He and Parker, by their careful and laborious investigations, have thrown much light on the origin and history of the catacombs.—BIBLIOGRAPHY: J. H. Parker, *The Archaeology of Rome: the Catacombs*; T. B. Englefield, *The Catacombs of St. Callistus, St. Sebastian, St. Domitilla*.

Catalani, Angelica (1779–1849), Italian opera singer. She first visited London in 1806, and was the greatest prima donna of her time. She retired in 1828.

Catalaunian Plain, the wide plain around Châlons-sur-Marne, where Aëtius, the Roman general, and Theodoric, King of the West Goths, gained a complete victory over Attila, A.D. 451.

Catalepsy, a spasmodic nervous disorder in which there is a sudden suspension of sensation and volition, with statue-like fixedness of the body and limbs in the attitude immediately preceding the attack. The rigidity then gives place to an equally



Catacomb of St. Cornelius, Rome

out in the sides of the cave. There are many catacombs in Egypt, Northern Africa, Sicily (Syracuse, Palermo), Malta,

remarkable state of unconscious flexibility; the limbs are maintained in any position or attitude in which the observer may place them.

Catalonia, an old province of Spain, bounded north by France, east and south-east by the Mediterranean, south by Valencia, and west by Arragon. The country in general is mountainous, but intersected with fertile valleys, while the mountains themselves are covered with valuable woods and fruit trees, the slopes being cut in terraces and plentifully supplied with water by an artificial system of irrigation. Wheat, wine, oil, flax, hemp, vegetables, and almost every kind of fruit are abundant. There are mines of lead, iron, alum, &c. On the coast is a coral-fishery. Catalonia stands pre-eminent for the industry of its inhabitants. Pop. 2,048,800; area, 12,430 sq. miles.—Cf. A. F. Calvert, *Catalonia and the Balearic Isles*.

Catalysis. The speed at which a chemical reaction takes place is often appreciably affected by the addition of some extraneous material, which, since it emerges from the reaction unchanged, apparently conduces by its mere presence to the alteration in the reaction velocity. Such a body is called a *catalyst* in respect of that particular reaction. Catalysis has found extensive practical application, as in the synthesis and oxidation of ammonia, the hardening of fats, and the manufacture of sulphuric acid.

It is necessary to renew the catalytic material at intervals, largely owing to the deleterious influence of certain impurities which act as *poisons*. There are other substances, termed *promoters*, which increase the activity of a catalyst. Each catalyst appears to possess its own individual list of poisons and promoters.

No comprehensive theory has yet been put forward in explanation of the activity of a catalyst. In the majority of cases there is reason to believe that it participates in the reaction, that is to say, the catalyst functions as a 'carrier' by temporarily combining with one reaction component to form an unstable body which is immediately decomposed by the other component, liberating the catalyst to repeat the process indefinitely.

Catamarca, a province of the Argentine Republic, South America; area, about 36,800 sq. miles; mountainous in all

directions except the south. Pop. 108,544. The capital is Catamarca. Pop. 13,262.

Catania, a city on the east coast of Sicily, capital of the province of Catania, at the foot of Mount Etna. It has been repeatedly visited by tremendous earthquakes, and has been partially laid in ruins by lava from eruptions of Mount Etna. Catania has always recovered from these earthquakes, however, and has much more the features of a metropolis than Palermo. There are ruins of an ancient theatre and of other ancient buildings. The manufactures include silk, sulphur, tobacco, soap, matches, Portland cement, and articles in amber and lava. The harbour was choked up by the eruption of 1669, but was greatly improved afterwards. The trade is of some importance, the chief exports being sulphur, oranges and lemons, wine, oil, liquorice, and lemon juice. Pop. 252,448.—The area of the province is 1907 sq. miles; pop. 892,032.

Catanzaro, a cathedral city of Calabria, South Italy, capital of province of same name, with manufactures of silk, &c. Pop. of town (1928), 43,087; of province (1928), 568,758. Area of province, 2034 sq. miles.

Cataract, a disease of the eye, consisting in opacity of the crystalline lens. Its earliest approach is marked by a loss of the natural colour of the pupil, and when developed it causes the pupil to have a milk-white or pearly colour. Most cases of cataract are found in elderly persons, but accidental injury to the eye and certain diseases may produce it. Children are sometimes born with cataract. Even when a cataract has 'ripened', and the patient is blind for all practical purposes, he can still distinguish between light and darkness. Cataract is treated by different surgical operations.

Catarrh is the medical term for a common cold. In the first stage either a Dover's powder or a dose of ammoniated quinine, followed by a hot bath and twenty-four hours in bed, may prove helpful. When the cold has started, the patient should be kept in bed for other people's sake as well as his own, and local remedies applied to relieve discomfort. In the third stage, when the profuse watery discharge tends to become sticky and muco-purulent, alkaline nasal lotions should be applied, either by snuffing up from the palm or by nasal irrigator. Such ordinary precautionary measures as sleeping with open

windows, wearing light yet warm clothing, and the avoidance of overheated rooms do much to prevent 'colds', especially in children. Should a child be troubled with repeated catarrhal attacks, it is advisable to have the nose examined for adenoids, or some similar condition.

Catawba, a river of the U.S.A., in the Carolinas, giving its name to a light wine of rich Muscadine flavour, which once acquired some celebrity.

Cateau-Cambrésis, or Le Cateau, a town, France, department of Nord, on the right bank of the Selle. It has various textile manufactures. Pop. 10,212.

Catechism, an elementary book containing a summary of principles in any science or art, but particularly in religion, reduced to the form of questions and answers. The first regular catechisms appear to have been compiled in the eighth and ninth centuries, those by Kero of St. Gall and Otfried of Weissenburg being most famous. In modern times Roman Catholic catechisms are generally a close copy of the one drawn up by the Council of Trent (published 1566). Among Protestants the catechisms of Luther (1518, 1520, and 1529) acquired great celebrity. Calvin's smaller and larger catechisms (1536-1539) never gained the popularity of those of Luther. The catechism of the Church of England is contained in the *Book of Common Prayer*. The catechism of the Church of Scotland is that approved of by the General Assembly in the year 1648. What is called the *Shorter Catechism* is merely an abridgment of the *Larger*, and is the one in most common use.—BIBLIOGRAPHY: A. F. Mitchell, *Catechisms of the Second Reformation*; H. Lee, *The Way of Worship: Lessons introductory to the Church Catechism*.

Catechu, a name common to several astringent extracts prepared from the wood, bark, and fruits of various plants. It is usually prepared by decoction and evaporation from the wood of *Acacia Catechu* (black catechu), or *Uncaria Gambir* (pale catechu or gambier). Catechu is a powerful astringent, and is much used in medicine, tanning, and dyeing.

Catechumens, a name originally applied to those converted Jews and heathens in the first ages of the Church who were to receive baptism, but were not permitted to share the sacrament. Afterwards it was applied to young

Christians who, for the first time, wished to partake of this ordinance, and for this purpose went through a preparatory course of instruction.

Categories, in logic, the most extensive classes or *genera* into which things can be distributed. Aristotle enumerated ten categories, Plato five, Descartes seven, and Kant twelve. Modern logicians accept the following fundamental categories: subject and object, relation, substance, quality, cause and effect, space and time.

Caterham, a town of England, in Surrey, with barracks for the foot guards. Pop. (Caterham and Warringham urban district) (1931), 19,503.

Cat-fish, one of the Siluroids, a widely-distributed family of freshwater bony fishes, represented by a large number of temperate and tropical species. The only European species is the Wels (*Silurus glanis*), found in the rivers east of the Rhine, and attaining a length of 13 feet and a weight of 400 lb.

Cathari, a name akin to 'Puritans', applied to several sects which first appeared in the eleventh century in Lombardy and afterwards in other countries of the West, and which were violently persecuted for their alleged Manichean tenets and usages. They had many other local names. The Cathari proper were dualists, of a type closely related to the older Gnostics, held a community of goods, abstained from war, marriage, and the killing of animals, and rejected water-baptism.

Cathcart, William Schaw, Earl of (1755-1843), British general. He served in the American War and against the French Republic in Flanders and Germany, and in 1807 commanded the land forces in the expedition against Copenhagen. He was for several years Ambassador to the Russian Court.

Cathedral, the principal church of a diocese, where the episcopal chair (*cathedra*) is kept. Cathedrals are often of great size; St. Peter's, Rome (1450), is 613 feet long and 450 feet across the transepts. Among other notable cathedrals are the cathedral at Milan, founded in 1386, built of white marble; the cathedral at Florence, begun about 1294, one of the finest specimens of the Italian-Gothic style; Cologne Cathedral, commenced in 1248 (and only finished recently); Notre-Dame, at Paris, begun 1163; and those of Amiens, Chartres, and Rheims. The most noteworthy

English cathedrals are St. Paul's, London (1675-1711), in the Renaissance style, and those of Canterbury, Ely, Exeter, Lichfield, Lincoln, Norwich, Salisbury, Wells, Westminster, and York. The cathedrals of Glasgow and Kirkwall are the only entire cathedrals in Scotland, exclusive of modern edifices.—BIBLIOGRAPHY: A. Fairbairns, *Cathedrals of England and Wales*; T. F. Bumpus, *Cathedrals of N. Italy*, *Cathedrals of N. France*.

Catherine I (1683-1727), Empress of Russia, and wife of Peter the Great. She was a woman of humble origin. In 1711 the emperor publicly acknowledged Catherine as his wife. At Peter's death in 1725 Catherine was proclaimed Empress and autocrat of all the Russias. She died suddenly two years later.

Catherine II (1729-1796), Empress of Russia. In 1745 she was married to Peter, nephew and successor of the Russian Empress Elizabeth, on whose death in 1762 her husband succeeded as Peter III. Catherine, with the assistance of her lover, Gregory Orlov, and others, won over the guards and was proclaimed monarch (July, 1762). Peter was strangled in prison a few days later. On the death of Augustus III of Poland she caused her old lover, Poniatowski, to be placed on the throne with a view to the extension of her influence in Poland, by which she profited in the partition of that country in the successive dismemberments of 1772, 1793, and 1795. By the war with the Turks, which occupied a considerable part of her reign, she conquered the Crimea and opened the Black Sea to the Russian navy. She constructed canals, founded the Russian Academy, and in a variety of ways contributed to the enlightenment and prosperity of the country.

Catherine, St. There are six saints of this name, of whom only two are of importance: (1) St. Catherine, a virgin of Alexandria who suffered martyrdom in the fourth century. She is represented with a wheel; and the legend of her marriage with Christ has been painted by several of the masters. (2) St. Catherine of Siena (1347-1380). Urban VI and Gregory XI sought her advice, and in 1460 she was canonized. Her poems and letters have been published.—Cf. E. G. Gardner, *Saint Catherine of Siena*.

Catherine de' Medici (1519-1589), wife of Henry II, King of France. Her

political power began on the death of Henry II, 10th July, 1559, and during the reign of her eldest son, Francis II, who, in consequence of his marriage with Mary Stewart, was devoted to the party of the Guises. The death of Francis placed the reins of government, during the minority of her son Charles IX, in her hands. Her influence with Charles IX was throughout of the worst kind, and the massacre of St. Bartholomew's Day was largely her work. After the death of Charles IX, in 1574, her third son succeeded as Henry III, and her mischievous influence continued. She died shortly before the assassination of Henry III.

Catherine Howard (1522-1542), fifth wife of Henry VIII. Her conduct appears to have been of a dubious kind both before and after marriage, and she was charged with adultery and beheaded.

Catherine of Aragon (1485-1536), first wife of Henry VIII. In 1501 she was married to Arthur, Prince of Wales, son of Henry VII. Her husband dying about five months after, the king, unwilling to return her dowry, caused her to be contracted to his remaining son, Henry, and a dispensation was procured from the Pope for that purpose. In 1527 Henry, having fallen in love with Anne Boleyn, pretended to doubt the legality of his union with Catherine. He applied therefore to Rome for a divorce, but the attitude of the Papal court ultimately provoked him to throw off his submission to it and declare himself head of the English Church. In 1532 he married Anne Boleyn; upon which Catherine retired to Ampthill, in Bedfordshire.

Catherine Parr (1512-1548), sixth and last wife of Henry VIII of England. She had had two husbands before she became Henry's queen in 1543. After the death of the king she espoused the Lord-Admiral Lord Thomas Seymour.

Catholic Apostolic Church. See *Irvingites*.

Catholic Emancipation, the abolition of those civil and ecclesiastical restraints to which the Roman Catholics of Great Britain, and particularly of Ireland, were once subjected. By the statutes of William III Roman Catholics were forbidden to hold property in land, and their spiritual instructors were open to the penalties of felony; and although these restrictions were not enforced for some years while

still in the statute book, they remained unrepealed in England until 1778. The proposal to repeal similar enactments on the Scottish statute books was delayed by the strenuous opposition of the Protestant associations, in connexion with which the Lord George Gordon riots occurred. In 1791, however, a Bill was passed allowing Roman Catholics who took the oath of allegiance to hold landed property, enter the legal profession, and enjoy freedom of education. In Ireland the Roman Catholics had been even more severely treated. Their public worship was proscribed, all offices and the learned professions were closed against them, they were deprived of the guardianship of their children, and if they had landed estates they were forbidden to marry Protestants. Burke and a strong body of followers took up their cause, and in 1792 and 1793 the worst of the disabilities were removed by the Irish Parliament. It was part of Pitt's scheme when the union with Ireland was formulated in 1799 to admit Irish Roman Catholics to the Parliament of the United Kingdom and to offices of State. To this proposal, however, George III was strongly hostile, and in 1801 Pitt was compelled to resign. Between that year and 1828 numerous attempts were made to abolish remaining disabilities, but without success, the Lords throwing out the Bills passed in the Commons, and George IV proving not less unyielding than his father. At length, in 1829 (10th April), an Emancipation Bill was carried through the Commons by Peel, and through the Lords by the Duke of Wellington. By this Act Catholics are eligible for all offices of State excepting the Lord Chancellorships of England and Ireland (the latter was thrown open to Catholics in 1867), the Lord-Lieutenancy of Ireland (abolished 1921), the office of Regent or Guardian of the United Kingdom, and that of High Commissioner to the Church of Scotland.

Catiline (Lucius Sergius Catilina) (c. 108–62 B.C.), Roman conspirator. In 66 B.C. he returned to Rome to contest the consulship, but was disqualified. Urged on by his necessities as well as his ambition, he entered into a conspiracy with other disaffected nobles. The plot, however, was revealed to Cicero, and measures were at once taken to defeat it. Catiline fled, and put himself at the head of a large but ill-armed following. Metellus Celer threw

himself between the rebels and their goal, while Antonius pressed upon their rear, and, driven to bay, Catiline turned upon the pursuing army and perished fighting.—Cf. G. Boissier, *Cicero and his Friends*.

Cat Island, one of the Bahama Islands, about 46 miles in length from north to south, and 3 to 7 miles in its mean breadth. Pop. 3000.

Catkin, or **Amentum**, a spike of apetalous unisexual flowers, usually pendulous; examples: birch, hazel, poplar.

Catlin, George (1796–1872), American ethnologist. His works are: *Manners, Customs, and Condition of the North American Indians* (1841); *North American Portfolio* (1844); *Eight Years' Travels and Residence in Europe* (1848); *Last Rambles amongst the Indians, &c.* (1868).

Cato, Dionysius, the reputed author of the small collection of moral apophthegms entitled *Dionysii Catonis Disticha de Moribus ad Filium* (Moral Couplets addressed to his son). It had an established reputation in the Middle Ages, and is referred to by Chaucer.

Cato, Marcus Porcius, the Censor, surnamed *Priscus*, also *Sapiens* and *Major* (the Wise and the Elder) (234–149 B.C.), Roman statesman. He accompanied Scipio to Sicily as quaestor in 204 B.C., became an ædile in 199 B.C., and in 198 B.C. was chosen prætor, and appointed to the province of Sardinia. Three years later he gained the consulship, and in 194 B.C. for his brilliant campaign in Spain obtained the honour of a triumph. For some years he exercised a practical censorship (he became censor *de iure* in 184 B.C.), scrutinizing the characters of candidates for office, and denouncing false claims, peculations, &c. His hostility to Carthage, the destruction of which he advocated in every speech made by him in the forum, was the most striking feature of his closing years. His incessant “*Delenda est Carthago*” (Carthage must be destroyed) did much to further the Third Punic War. Of his works his *De Agricultura* or *De Re Rustica* alone survives.

Cato, Marcus Porcius (called Cato of Utica, the place of his death, to distinguish him from the Censor, his great-grandfather) (95–46 B.C.), Roman philosopher. He formed an intimacy with the Stoic Antipater of Tyre, and ever remained true to the principles of the Stoic philo-

sophy. He was made quæstor in 65 B.C. His rigorous reforms won him general respect, and in 63 B.C. he was chosen tribune of the people. On the breach between Pompey and Cæsar he threw in his lot with Pompey, and guarded the stores at Dyrrhachium, while Pompey pushed on to Pharsalia. After receiving news of Pompey's defeat, he sailed to Cyrene and effected a junction with Metellus Scipio at Utica in 47 B.C. He took command of that city, but its defence appearing hopeless after the defeat of Scipio at Thapsus, he determined on suicide, and stabbed himself with his sword.

Cats, Jacob (1577-1660), Dutch poet and statesman. His works include: *Emblems of Fancy and Love*, *Galatea*, *The Mirror of Past and Present*, &c. In 1627 and 1657 he was Ambassador to England. His autobiography, *Eighty-two Years of my Life*, was first printed in 1734.

Cat's-eye, a variety of quartz including fibres of asbestos, which give it opalescence. When cut *en cabochon*, that is, with a spherical or ellipsoidal surface, it resembles a cat's eye.

Catskill Mountains, a range of mountains in New York State, U.S.A., west of and nearly parallel to the Hudson.

Cattegat. See *Kattegat*.

Cattle. This is the popular name of the ruminants, otherwise known as the 'true' oxen, which belong to the genus *Bos*, and are included in the family *Bovidae*, together with sheep, goats, and antelopes. The genus *Bos* embraces a considerable number of species; but 'cattle' appear to have diverged along two different lines, one now represented by the humped oxen of South Asia, and the other by the humpless European breeds familiar in this country. The former have probably descended from the extinct *Bos indicus*. In the case of British cattle one suggested ancestor is the great ox or urus (*Bos primigenius*). There are eighteen or nineteen British breeds now recognized. It is likely that the Welsh and Kerry breeds, among existing races, are most nearly allied to the small black cattle of pre-Roman Britain.

Welsh cattle are of several varieties, which all possess long horns, while black is the predominant colour. They are noted for beef-production, while some strains have been specialized for dairy purposes. The *Kerry* breed, native to

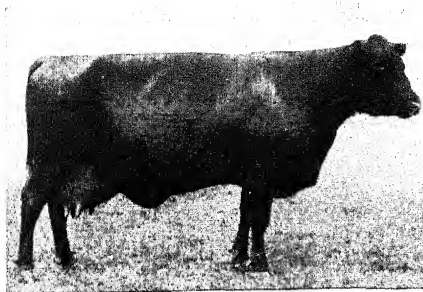
South and West Ireland, is a small and active type, with short up-standing horns, and is a notable milk-producer. The short-legged *Deater* is a useful dual-purpose breed, and may be either black or red.

Lincoln Reds, an excellent dual-purpose breed, closely allied to the Shorthorns, began to be selected as a special strain about the end of the seventeenth century. *Red Polls* are also dual-purpose cattle, and their chief characteristics have been acquired by the intermixture of two earlier types, the Norfolk and Suffolk. The *Sussex* breed is large and brownish-red in colour, with short horns curving forwards and upwards. As a beef-producer it is greatly esteemed. The *North Devons* are also a beef breed, smaller and more graceful than the *Sussex* type, and making the most of poor hill pastures. *South Devons* (Hams) are red or orange in colour, with white spreading horns. They attain a very large size, and, though mainly of repute for beef-production, present great possibilities as dairy cattle. *Herefords* are greatly esteemed as a beef breed, and are of large size. Red is the prevailing colour, but the face, upper side of the neck, and under side of the body are white. The old Norfolk polled breed was essentially of Scandinavian type, and its hornlessness has been inherited by the *Red Polls*. *British Friesian*, the most recent of our recognized breeds, are distinguished by their black-and-white colour, and noted as milk-producers, though the abundant milk is not very rich. *Shorthorns* give another example of colour mixture, white and red being present in varying proportions, while pure red and pure white are not unknown. Shorthorns have a great and well-deserved reputation as dual-purpose cattle, while milking characters are being increased in the sub-breed known as Dairy Shorthorns.

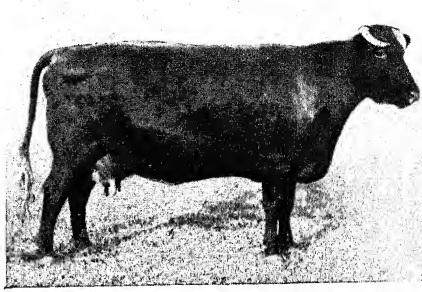
Jerseys are dairy cattle pure and simple, and their colours are fawn, silver-grey, and mulberry, to which a certain amount of white may be added. The muzzle is dark, surrounded by a light band. *Guernseys* are larger and less shapely, but equally esteemed as producers of rich milk. They are typically fawn-coloured, often with white markings, while the muzzle is never dark.

Longhorns are a large dual-purpose breed, possessed of widely-curving horns, and their chief colours are brown, mul-

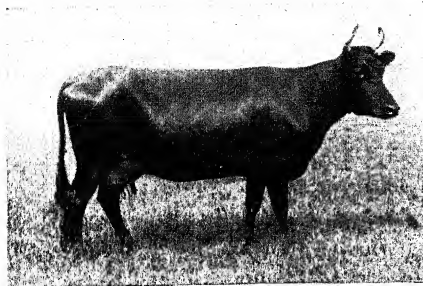
BRITISH CATTLE



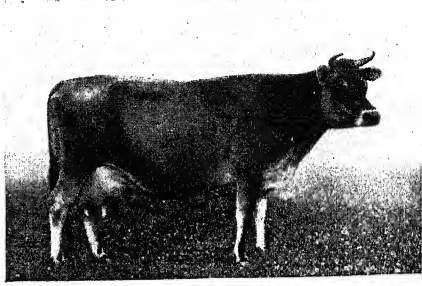
Red Poll



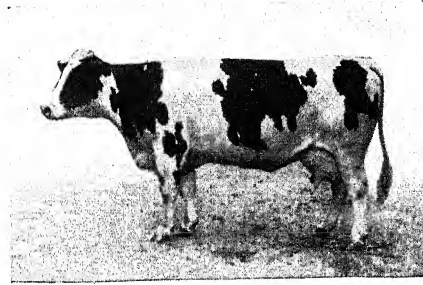
Lincoln Red



Kerry



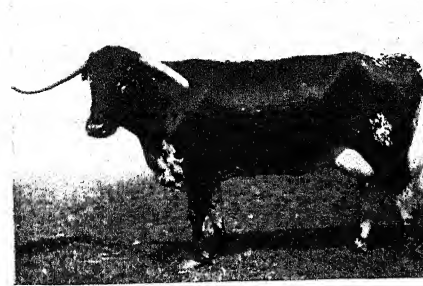
Jersey



British Friesian



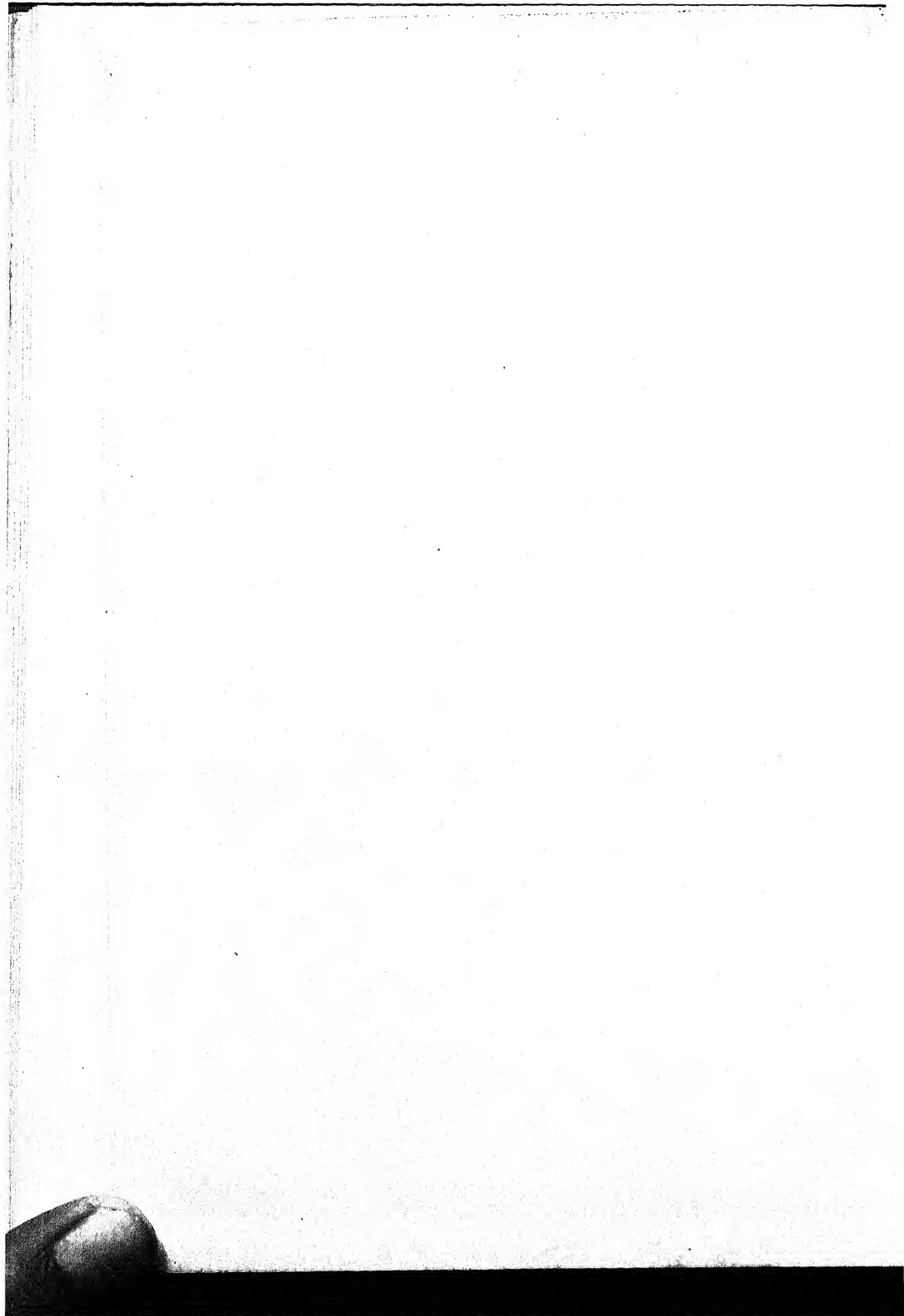
Shorthorn



Longhorn



Ayrshire



berry, and brindle, with a certain amount of white, especially along the back. *Highland* cattle are small and hardy, with well-developed horns, and are classed among the beef breeds. The hair is very abundant, and the colours are black, red, yellow, dun, and brindle. *Ayrshires* are a wedge-shaped dairy breed, already well established in West Scotland by the end of the seventeenth century. In colour they are a mixture of white and red, the former predominating. *Galloways* are a small black-polled breed, noted for the quality of their beef. *Aberdeen-Angus* cattle, native to the north-east of Scotland, resemble Galloways in being hornless and black in colour, and also in being a noted beef breed, but they are of larger size.—Cf. R. Wallace, *Farm Live Stock of Great Britain*.

Cattleya, a genus of orchids, natives of tropical America, growing on trees and rocks, with showy flowers, and much cultivated in greenhouses.

Catullus, Gaius Valerius (84–54 B.C.), the greatest lyric poet of Rome. He was of good family, and was himself well-to-do. He went to Rome probably in 63–62 B.C., and there he met the notorious Clodia, a woman eleven years older than himself. He fell passionately in love with her, and immortalized her under the name of Lesbia. Catullus went to Bithynia in 57 B.C. with the prætor Memmius, and his songs of travel (31 and 46) are among the most charming of his poems. It is believed that he died of consumption.

The poems of Catullus consist of 116 pieces, varying in length from two to four hundred and eight lines. Catullus was an admirer of Callimachus and of the Alexandrian school of poetry, and some of his elegiac pieces are forced and artificial (e.g. 66, and to some extent 68). In *Carm.* 68 he implies that he cannot write without his library. His Alexandrian poems are not of much account; but his spontaneous lyric poems do count; they spring straight from his passionate heart, and set him alone with Sappho and Shelley. He is the greatest of all Latin poets in poetic gifts and musical language. No love poems yet written are more exquisite than his, and in other kinds of poetry, in bantering his friends (14) or himself (10, 13, 44), in attacking his enemies (23, 29, 39), in a beautiful poem like the Sirmio one (31), in a poem of consolation like 96, or of

mourning for his brother (101), he has the pre-eminence over all Roman poets. He has a style of imperious lucidity, which, when we try to follow it, “makes mouths at our speech”, as Swinburne happily said of it.—BIBLIOGRAPHY: Robinson Ellis, *Commentary on Catullus*; H. A. J. Munro, *Criticisms and Elucidations of Catullus*; W. Y. Sellar, *The Roman Poets of the Republic*.

Cauca, a South American river in Colombia, an important tributary of the Magdalena; length, 600 to 700 miles. It gives its name to a department or state of Colombia; area, 20,403 sq. miles; pop. 238,779.

Caucasian Race. See *Asia*.

Caucasus, a chain of mountains which traverses the former Russian lieutenantancy of Caucasus from north-west to south-east through a length of 700 miles. It does not form a single chain, but is divided, at least for part of its length, into two, three, or even four chains, which sometimes run parallel to one another, and sometimes meet and form mountain ganglions. The heights of the chief summits are: Elbrus, 18,572 feet; Kosh-tan-tau, 17,123 feet; Dych-tau, 16,928 feet; Kasbek, 16,546 feet. The chief rivers are the Terek and Kur, flowing into the Caspian, and the Kuban and Rion into the Black Sea. The northern part of the Caucasus region produces little but grass; but the slopes and valleys on the south, and especially those nearest the Black Sea, produce various kinds of fruits, grain of every description, rice, cotton, hemp, &c. The minerals are valuable. At Baku on the Caspian immense quantities of petroleum are obtained. The inhabitants consist of small tribes of various origin and language—Georgians, Abassians, Lesghians, Ossetes, Circassians, Tatars, Armenians. Some of them are Greek and Armenian Christians, others are Mahomedans and Jews. The Caucasian tribes, especially the Circassians, attracted much attention for over half a century by their stubborn resistance to the arms of Russia. This resistance came to an end in 1859 by the capture of Shamyl, their most distinguished leader.

Cauchy, Augustin Louis (1789–1857), French mathematician, and for many years professor at the École Polytechnique, made important advances in nearly every branch of mathematics and mathematical physics. He lived in the golden age of

French mathematics, but it is the work of Cauchy, rather than that of any of his great contemporaries, and especially his work on the theory of convergence and on functions of a complex variable, which has directed the development of mathematical analysis during the last century.

Caucus, a term, originally American, for a private meeting of citizens to agree upon candidates to be proposed for election to offices or to concert measures for supporting a party. In Britain the term is applied to a system of political organization, where all electioneering business is managed by a representative committee of voters.

Caudine Forks, a pass of Southern Italy, in the form of two lofty fork-shaped defiles, in the Apennines, into which a Roman army was enticed by the Samnites, 321 B.C., and being hemmed in was forced to surrender.

Caudry, a town of Northern France, department of Nord, with manufactures of tulle, lace, and woollens. Pop. 10,000.

Cauliflower, a garden variety of cabbage, in which cultivation has caused the inflorescence to assume when young the form of a compact fleshy head. It is the tenderest of all the cabbage tribe. Broccoli is a coarser and hardier form of the cauliflower.

Caulking, of a ship, driving a quantity of oakum into the seams of the planks in the ship's decks or sides in order to prevent the entrance of water. After the oakum is driven very hard into these seams, it is covered with hot melted pitch to keep the water from rotting it. The term is also applied to tightening joints formed by overlapping metal plates, as in a boiler or ship's hull.

Cause, that which produces an effect. Aristotle divides causes into four kinds: efficient, formal, material, and final. The efficient cause is the agency by which a result is produced; the formal, the means by which it is produced; the material, the substance from which it is produced; the final, the purpose or end for which it is produced.

Caustic, a name given to various substances which burn or corrode the skin or other tissues.—*Lunar caustic*, a name given to nitrate of silver when cast into sticks for the use of surgeons and others.—*Caustic potash* is potassium hydrate,

KOH.—*Caustic soda* is sodium hydroxide, *NaOH*.

Caustic, in optics, the name given to the curve to which the rays of light, reflected or refracted by another curve, are tangents. The caustic formed by reflection may be observed in a full teacup.

Cautin, a province of Chile; area, 6381 sq. miles; pop. 193,628.

Cauvery, a river of Southern India which falls into the Bay of Bengal by numerous mouths. It is largely utilized for irrigation, and is known as the Ganges of the South.

Cava dei Tirreni, a town, South Italy, 3 miles north-west of Salerno, with manufactures of silk, cotton, and linen. Pop. (of town), 10,000.

Cavaignac, Louis Eugène (1802–1857), French general. When the Revolution of 1848 broke out, Cavaignac was appointed Governor-General of Algeria, but returned to Paris and was appointed Minister of War. At the outbreak of the June insurrection Cavaignac was appointed dictator with unlimited powers. By the energy of Cavaignac the insurrection was suppressed, and France saved from a threatened dissolution of all the bonds of society. Towards the close of the year he became a candidate for the presidency of the Republic, but was defeated, and Louis Napoleon was preferred to the office. On 20th Dec. he resigned his dictatorship.

Cavaillon, a town of Southern France, department of Vaucluse, an important railway junction. Pop. 9940.

Cavalcanti, Guido (c. 1250–1300), Florentine philosopher and poet. He was the friend of Dante, who dedicated to him his *Vita nuova*. His chief work is his *Canzone d'Amore*.

Cavalier, Jean (1681–1740), leader of the Camisards in the war of the Cévennes. He forced Marshal Villars to make a treaty with the Camisards. Cavalier then took service under the Earl of Peterborough and Sir Cloudesley Shovel in Spain, where he commanded a regiment of refugee Camisards. He was afterwards appointed Governor of Jersey.

Cavalry, troops which fight on horseback and depend for their full effect on shock-action and the *arme blanche*. They are also armed with rifles and machine-guns, which enable them to employ fire-

action when dismounted, though this fire-effect when so employed is less than that of an equal number of infantry, owing to the necessity of detaching a proportion of men to act as horse-holders. The chief duties of cavalry, according to modern ideas, are the service of security, reconnoitring, and pursuit. In the British service cavalry is organized in regiments of three squadrons, each commanded by a major or senior captain; four troops, each commanded by a captain or subaltern, make a squadron; and troops are again subdivided into sections, each under a non-commissioned officer. — BIBLIOGRAPHY: G. T. Denison, *A History of Cavalry*; E. Nolan, *Cavalry: its History and Tactics*; Earl Haig, *Cavalry Studies*.

Cavan, Frederick Rudolph Lambart, tenth Earl of (1865–), British soldier. During the European War he commanded the 14th Corps, and went to Italy in Nov., 1917. When General Sir Herbert Plumer returned to France, Cavan became head of the British forces in Italy.

Cavan, an inland county, Irish Free State; area, 467,025 acres, of which three-fourths are arable. The north-western part is hilly; the remaining surface is pervaded by bog and interspersed with many lakes; the soil is generally poor. Oats, flax, and potatoes are the chief crops. The principal towns are Cavan, Cootehill, and Belturbet. Pop. (1926) 82,447.

Cavan, the county town of County Cavan, Irish Free State, has a considerable trade in farm produce. Pop. (1926) 3056.

Cave, George Cave, first Viscount (1856–1928), British lawyer and politician. He was educated at Merchant Taylors' School and St. John's College, Oxford. He was called to the Bar in 1880, took silk in 1904, and became Master of the Bench in 1913. He was Solicitor-General from 1915 to 1916, and Secretary of State for Home Affairs from 1916 to 1919. He became Lord Chancellor in Oct., 1922, and again in Nov., 1924. In 1925 he was elected Chancellor of the University of Oxford.

Cave, or Cavern, an opening of some size in the solid crust of the earth beneath the surface. Caves are principally met with in limestone rocks, sometimes in sandstone and in volcanic rocks. Some of them have a very grand or picturesque appearance, such as Fingal's Cave in Staffa; others, such as the Mammoth Cave of Kentucky, which encloses an extent of

about 40 miles of subterranean windings, are celebrated for their great size and subterranean waters; others for their gorgeous stalactites and stalagmites; others are of interest to the geologist and archaeologist from the occurrence in them of osseous remains of animals no longer found in the same region, perhaps altogether extinct, or for the evidence their clay floors and rudely-sculptured walls, and the prehistoric implements and human bones found in them, offer of the presence of early man. See *Cave-dwellers*.

Caveat, in law, a process in a court to stay proceedings until the party entering the caveat has had an opportunity of putting forward his objection, as in proceedings about to be taken under a disputed will; to prevent the patenting of an invention, or the enrolment of a decree in chancery, in order to gain time to present a petition of appeal to the Lord Chancellor.

Cave-dwellers. During the Stone Age in Europe, and probably during the early history of the human race in every country, caves were the usual place of retreat and the dwelling-place of men; and most of the remains of early man, his tools, and the evidences of his customs have been recovered from caves. The best-known dwellings of ancient man in Britain are Kent's Cavern, near Torquay; Brixham Cave, in the same neighbourhood; Paviland Cave, in South Wales; Kirkdale Cavern, in Yorkshire; Victoria Cave, near Settle in Yorkshire; and Cresswell Crags Cave, in Derbyshire, and many others in the same county; others in the Mendips and in the Vale of Clwyd and elsewhere. These caves have been inhabited by man at various epochs during the so-called Old Stone and New Stone Ages, as well as in more recent times, and some of them contain remarkable collections of the bones of animals used by man as food, and flint implements used in killing and carving his prey. Many other famous caves have been explored in Belgium, Germany, Switzerland, Italy, Croatia, and in other parts of the world; but none of them have yielded so much information concerning early types of men, their implements, their manner of life, the animals they hunted, and their artistic ability as the caves of France and Northern Spain. The most famous of these caves are situated in the Dordogne valley, in the neighbour-

hood of the Pyrenees, and at Grimaldi, near Mentone.

Cavell, Edith (1865–1915), English nurse. Trained as a nurse, she was appointed matron of the *École Belge d'Infirmières Diplômées*, at Brussels, in 1907. Here the European War found her. Miss Cavell was arrested on 5th Aug., 1915, condemned to death on 11th Oct., and shot in the early morning on the 12th. The charge upon which she was condemned was that of having harboured in her house French and British soldiers as well as Belgians of military age, and of having facilitated their escape from Belgium.

Cavendish, Henry (1731–1810), English physicist and chemist. He greatly contributed to the progress of chemistry, the properties of hydrogen and the composition of water being among his discoveries. He also wrote on electricity, proving the law of the inverse square in electrostatics, and determined the mean density of the earth. His writings consist of memoirs in the *Philosophical Transactions*.

Cavendish, Spencer Compton. See *Devonshire, Eighth Duke of*.

Cavendish, or Candish, Thomas (c. 1555–1592), English circumnavigator. He sailed from Plymouth in 1586, took and destroyed many vessels, ravaged the coasts of Chile, Peru, and New Spain, and returned by the Cape of Good Hope, having circumnavigated the globe in two years and forty-nine days, the shortest period in which it had then been effected.

Caviare, the roes of certain large fish prepared and salted. The best is made from the roes of the sterlet and sturgeon, caught in the lakes or rivers of Russia. Astrakhan, on the Caspian Sea, is a centre of this industry.

Cavite, a town in the Island of Luzon, one of the Philippines. It is a naval station with docks and arsenal. It gives its name to a province with a pop. of 134,779. Pop. of town, about 5500.

Cavour, Count Camillo Benso di (1810–1861), Italian statesman. He became a member of the Sardinian Chamber of Deputies in 1849, and the following year Minister of Commerce and Agriculture. In 1852 he became Premier, and not long afterwards took an active part in cementing an alliance with Great Britain and France, and making common cause with these powers against Russia during the Crimean War. The attitude, however, thus

taken by Sardinia could not fail to prove offensive to Austria. A collision, therefore, was inevitable, resulting in the campaign of 1859. In 1860 Garibaldi's expedition to Sicily took place; but towards this and the subsequent movements of the Italian liberator Count Cavour was forced to maintain an apparent coldness. He lived to see the meeting of the first Italian Parliament, which decreed Victor Emmanuel King of Italy.—**BIBLIOGRAPHY:** E. Dicey, *A Memoir of Cavour*; W. R. Thayer, *Life and Times of Cavour*.

Cavy, the popular name for a genus of rodent animals (*Cavia*), family Caviidae, natives of tropical America, the most familiar example being the guinea-pig.

Cawnpore, a city, India, United Provinces, on the right bank of the Ganges. It has manufactures of leather and cotton goods, and a large trade. It is also an important railway junction. Including the native city, cantonments, and civil station, it has a pop. of 216,436. In 1857 the native regiments stationed there mutinied, and a terrible massacre took place.—The district of Cawnpore, in the Allahabad division, has an area of 12,384 sq. miles and a pop. of 1,142,286.

Caxamarca, a mountainous interior department of Northern Peru, with a capital of the same name. The products of the department include maize, wheat, tobacco, and wool; and silver is mined. Area, 12,538 sq. miles; pop. 442,412. The town is connected by rail with the Pacific coast. It has manufactures of arms, straw hats, woollens, and cottons. Pop. about 12,000.

Caxias, a town of Brazil, in the state of Maranhão, on the Itapicuru, which here is navigable. Rice and cotton are cultivated here. Pop. about 10,000.

Caxton, William (c. 1422–1491), the first English printer. He probably learned the newly-discovered art of printing at Cologne; and his *Recuyell of the Historyes of Troye* (from the French of Raoul le Fèvre) was printed about 1474, probably at Bruges, and is the earliest specimen of typography in the English language. His *Game and Playe of the Chesse* (Bruges, 1475) is the second English book printed. In 1476 he returned to England, and in 1477 printed at Westminster Lord Rivers's translation of *The Dictes and Sayengis of the Philosophres*, the first book printed in England. In fourteen years he printed

nearly eighty separate books. He translated twenty-one books, mainly romances, from the French, and one (*Reynard the Fox*) from the Dutch, helping materially to fix the literary language. Besides the works named above, he printed Chaucer's *Canterbury Tales*, *Troilus and Creside*, *House of Fame*, and translation of Boethius; Gower's *Confessio Amantis*; works by Lydgate; Malory's *Morte Darthur*; *The Golden Legend*; and *The Fables of Æsop*. His books have no title-pages, but are frequently provided with prologues and colophons. His types are in the Gothic character, and copied so closely from the handwriting of his time that many of his books have been mistaken for manuscript. In some no punctuation is used; in others the full point and colon only; commas are represented by a long or short upright line. Copies of some of his books now fetch extraordinary prices. A unique copy of the *Morte Darthur* has brought £1950, the *Recuyell* £1820, and *The Royal Book* £2225 (in 1902).—BIBLIOGRAPHY: William Blades, *Life and Typography of William Caxton*; E. Gordon Duff, *William Caxton*.

Cayenne, the capital of the colony of French Guiana, is a seaport on an island of same name. It is a noted penal settlement, and has a large but shallow harbour which is now being improved. It exports gold, phosphates, spices, and cocoa. Pop. 10,146.

Cayenne Pepper, the name given to the powder formed of the dried and ground fruits, and more especially the seeds, of various species of *Capsicum*, and especially of *C. frutescens*. It is used both in cookery and in medicine.

Cayley, Arthur (1821–1895), English mathematician. He entered Trinity College, Cambridge, in 1838, and in 1842 graduated as senior wrangler, gaining the Smith's prize in the following year. He was called to the Bar at Lincoln's Inn in 1849, and after fourteen years' practice as a conveyancer, was appointed, in 1863, to the Sadleirian professorship of pure mathematics at Cambridge. Cayley was a mathematician of marvellous power and range, and modern mathematics owes him much. His papers, more than nine hundred in number, have been published in 13 vols. (1889–1899) by the University of Cambridge under the title of *Collected Mathematical Papers*.

Cayman, or **Caiman**, the name given to several species of tropical American alligators found on the banks of the Amazon.

Cayman Islands, three islands situated about 140 miles north-west of Jamaica, of which they are dependencies. Grand Cayman, the largest, is 17 miles long and from 4 to 7 miles broad, and has two towns or villages. The inhabitants, 3945 in number, partly descendants of the buccaneers, are chiefly employed in catching turtle. The other two islands are Little Cayman (pop. 95) and Cayman Brac (pop. 1213).

Cazalla-de-la-sierra, a town, Spain, Andalusia, on a declivity of the Sierra Morena, which is here rich in timber and metals. Pop. 10,000.

Cazembe's Dominion, formerly a native state of Central South Africa, lying to the south of Lake Tanganyika, in the region of which Lakes Moero and Bangweulu are important features. It now belongs partly to Rhodesia, partly to the Belgian Congo.

Ceara, a state on the northern coast of Brazil; area, 40,241 sq. miles. Among its productions are numerous medicinal plants, gums, balsams, and resins; cotton, coffee, sugar-cane, &c., are cultivated. Ceara, or Fortaleza, the capital, is situated on the coast, and carries on a considerable trade in rubber, coffee, sugar, &c. Pop. of state, 1,319,228; of town, 78,536.

Cebu, one of the Philippine Islands, lying between Luzon and Mindanao, 135 miles long, with an area of 1695 sq. miles. Sugar cultivation and the manufacture of abaca are the chief industries. Pop. 592,242.—The town of Cebu, the oldest Spanish settlement on the Philippines, is a place of considerable trade, the chief export being hemp. The harbour accommodates vessels drawing 28 feet. Pop. 56,502.

Cecco d'Ascoli, whose proper name was **Francesco degli Stabili** (1257–1327), Italian poet. His chief work, *L'Acerba*, a kind of poetic cyclopædia, passed through many editions.

Cecil, Robert Gascoyne-Cecil, first Viscount (1864–), British politician, third son of the third Marquess of Salisbury. During the European War he was Parliamentary Under-Secretary for Foreign Affairs from 1915 to 1916, and, whilst retaining this office, also Minister of

Blockade from 1916 to 1918. Refusing to consent to Welsh disestablishment, he resigned office in Nov., 1918. At the Peace Conference in Paris he was British delegate to the League of Nations. He became Chancellor of the Duchy of Lancaster in Nov., 1924, and resigned in Aug., 1927.

Cecilia, Saint, the patron saint of music. In the Roman Catholic Church her festival (22nd Nov.) is made the occasion of splendid music. Her story forms one of Chaucer's *Canterbury Tales*.

Cecrops, according to tradition, the founder of Athens and the first King of Attica. He was said to have taught the savage inhabitants religion and morals, and made them acquainted with the advantages of social life.

Cedar (*Cedrus Libani*), a coniferous tree, three species of which have been introduced into Britain. The name is given also to the deodar (*C. Deodāra*), native of India, a large and handsome tree, growing in the Himalayas to the height of 150 feet, with a circumference of 30 feet. The leaves are tufted or solitary, larger than those of the cedar of Lebanon, and very numerous, of a dark-bluish green, and covered with a glaucous bloom. The wood is well adapted for building purposes, being compact and very enduring. The Mount Atlas cedar (*C. atlantica*) was introduced into Britain in 1843. The name is also applied to many trees which have no relation to the true cedar, as the Bermuda cedar (*Juniperus bermudiāna*), used for making pencils, the red cedar (*J. virginiana*), the Honduras, or bastard Barbadoes cedar (*Cedrela odorata*), and the red cedar of Australia (*C. australis*).

Cedar Lake, a lake in Canada, an expansion of the Saskatchewan before it enters Lake Winnipeg.

Cedar Rapids, a flourishing town of the U.S.A., in Iowa, on Red Cedar River, with large railway machine-shops and numerous industrial establishments. The river rapids furnish power for the various factories. Pop. 45,566.

Cefalu, a seaport on the north coast of Sicily. The trade is small, but a productive fishery is carried on. Pop. 14,340.

Celandine, a name given to two British plants: (1) the greater celandine, belonging to the poppy family, sometimes called swallow-wort; and (2) the lesser celandine, often called pilewort, with golden petals, blossoming in early spring.

Celaya, a town of Mexico, state of Guanajuato, on the Rio Laja, with manufactures of leather, saddlery, woollens, and cottons. Pop. 23,062.

Celebes, one of the larger islands of the Dutch East Indies, between Borneo on the west and the Moluccas on the east. It consists mainly of four large peninsulas stretching to the east and south, and separated by three deep gulfs; total area, 72,679 sq. miles (including the dependent islands). No part of it is more than 70 miles from the sea. Celebes is mountainous chiefly in the centre and the north, where there are several active volcanoes. It has also broad grassy plains and extensive forests. Gold and sulphur are found in all the valleys of the north peninsula. Copper occurs at various points, and in Macassar tin is found. Diamonds and other precious stones are found. The island is entirely



Greater Celandine

1, Section of flower. 2, Fruit. 3, Cross-section of fruit.

destitute of feline or canine animals, insectivora, the elephant, rhinoceros, and tapir; but it has the antelopean buffalo (Anoa) and the spiral-tusked pig (Babyroussa). Trepan and turtle are caught in abundance. Among the trees are the oak, teak, cedar, upas, and bamboo. Among cultivated plants are the coffee tree, indigo, cacao, sugar-cane, manioc root, and to-

bacco. The maritime districts are inhabited by Malays; the Peninsula of Macassar is occupied by Bugis and Macassars. Mandhars dwell in the west of the island, and the mountainous regions in the interior, especially in the north, are inhabited by Alfuros. The capital is Macassar, in the south-west of the island. The trade in trepang is very important, Macassar being the chief staple place for this article of commerce. The three great languages of the island, not reckoning the dialects of the savage tribes, are those of the Bugis, the Macassars, and the Mandhars. The ancient Bugi is the language of science and religion. The Bugis have a considerable body of literature. Celebes was first visited by the Portuguese in 1512. Pop. estimated at 2,347,645.—Cf. J. J. Abrahams, *A Surgeon's Log*.

Celery, an umbelliferous plant indigenous to the ditches and marshy places near the sea-coast in England and Ireland, and elsewhere in Europe, and long cultivated in gardens as a salad and culinary vegetable. There are two varieties in cultivation, viz. red and white stalked, and of these many sub-varieties.

Celestine (SrSO_4), native strontium sulphate occurring associated with sulphur as fine crystals in the Sicilian sulphur-deposits. It is transparent and colourless, but sometimes reddish or a delicate blue.

Celibacy, the state of being celibate or unmarried; specially applied to the voluntary life of abstinence from marriage followed by many religious devotees and by some orders of clergy. The ancient Egyptian priests preserved a rigid chastity; the priestesses of ancient Greece and Rome were pledged to perpetual virginity; and celibacy is the rule with the Buddhist priests of the East. Among Christians, the marriage of the clergy was freely permitted for the first three centuries of the Christian era, but by the Council of Elvira in Spain (305) continence was enjoined on all who served at the altar. For centuries this subject led to many struggles in the Church, but was finally settled by Gregory VII positively forbidding the marriage of the clergy. The Council of Trent (1593) confirmed this rule. In the Greek Church celibacy is not compulsory on the ordinary clergy. The Protestants denounced clerical celibacy, and all the great creeds and confessions of the time reflect their feelings on the question. Protestants hold that there

is no moral superiority in celibacy over marriage, and that the Church has no right to impose such an obligation on any class of her ministers.—Cf. H. C. Lea, *History of Sacerdotal Celibacy*.

Cell. (1) In biology a *cell* is a microscopically small semi-fluid portion of matter, consisting of a soft mass of living, contractile, jelly-like matter, and a central structure, consisting of a small roundish body, called the *nucleus*, generally more solid than the rest of the cell, and which may have within it a still more minute body, the *nucleolus*. See *Cytology*. (2) In electricity. See *Voltaic Cell*.

Celle, a town in Prussia, province of Hanover, in the midst of a sandy plain, at the confluence of the Fuse with the Aller, which is navigable. The principal industries are the making of soap and of jam, and the trade is extensive. Pop. 23,800.

Cellini, Benvenuto (1500–1571), Italian sculptor, engraver, and goldsmith. His works may be divided into two classes. The first, for which he is most celebrated, comprises his smaller productions in metal, the embossed decorations of shields, cups, salvers, ornamented sword and dagger hilts, clasps, medals, and coins. The second includes his larger works as a sculptor, such as the *Perseus with the head of Medusa* at Florence; a colossal *Mars* for a fountain at Fontainebleau; a marble *Christ* in the Escorial Palace; a life-size statue of *Jupiter* in silver; &c. His *Autobiography*, translated into English by J. A. Symonds (1896), is very racy and animated.—Cf. R. H. H. Cust, *The Life of Benvenuto Cellini*.

Cellular Tissue. See *Tissues*.

Cellulitis, inflammation of the tissues underlying the skin. It is caused by organisms, and leads to suppuration, sloughing, or even extensive gangrene. The treatment is by incisions and dressing of the affected part.

Celluloid, an artificial substance extensively used as a substitute for ivory, bone, hard rubber, and coral, having a close resemblance to these substances in hardness, elasticity, and texture. It is composed of gun-cotton (cellulose nitrate) and camphor, and is moulded by heat and pressure to the desired shape. It is used for buttons, handles for knives, forks, and umbrellas, billiard-balls, piano keys, napkin-rings, backs to brushes, &c. It can be variously coloured, and is dan-

gerous on account of the readiness with which it takes fire.

Cellulose, a generic name for the substances of which cell-membranes of plants are composed. Cellulose ($C_6H_{10}O_5$)_n belongs to the class of substances known as carbohydrates, and is allied to starch; thus when treated with dilute mineral acids it yields sugar, just as starch does. Cellulose is obtained from plant tissues. Cotton-wool is almost pure cellulose, and wood-pulp for paper-making consists mainly of cellulose; paper itself is impure cellulose. Various methods of artificial silk manufacture are based on the changes which cellulose undergoes on treating with chemicals. 'Viscose', used largely in photographic-film manufacture, is also specially-prepared cellulose. Many important derivatives of cellulose are used; for example, *collodion* and *gun-cotton* are prepared by treating cellulose with nitric acid. It is important to see *Silk, Artificial*.

Celsius, the name of a Swedish family, several members of which attained celebrity in science and literature. The best known is *Anders Celsius* (1701-1744), professor of astronomy at the University of Upsala, and inventor of the Centigrade thermometer.

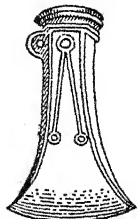
Celsus, second-century opponent of Christianity. His book *Logos Alēthēs* has perished; but extracts from it are preserved in Origen's rejoinder, *Contra Celsum*.

Celsus, Aurelius (or perhaps Aulus) Cornelius, Latin author of the first century A.D. He is best known by his *De Medicina*, long one of the chief manuals on medicine.

Celts, The. The references to the Celts by early Greek writers are somewhat vague, but it can be gathered that they occupied the Danube valley and were extending their sphere of influence westward towards Spain about the fifth century B.C. They raided Greece, were repulsed in the neighbourhood of Parnassus, and afterwards crossed to Asia Minor in ships and plundered its sea-coast. They then occupied the country which became known as Galatia. The Celts of Gaul are most frequently referred to by ancient writers. The Roman conquest of Gaul broke up the Celtic confederacies. It is uncertain when the Celts first invaded Britain. The Celtic dialects, like the Italic, were divided into 'P' and 'Q' groups. Apparently the P-Celts came first. In Ireland, Scotland, and the Isle of Man the Q-Celts are

represented linguistically by Gaelic; the P-Celts are represented by Welsh, Cornish (now extinct), and Breton. The ancient Britons were P-Celts.

Celts, prehistoric weapons or other implements of stone or bronze which have been found over nearly the whole surface of the earth. The materials of which they are made are flint, chert, clay-slate, porphyry, various kinds of greenstone and of metamorphic rocks, and, in short, any very hard and durable stone. Bronze celts belong to a later period than stone ones, and are not so numerous.



Bronze Celt

Cements, the general name for any material which causes adhesion between two surfaces, or forms a matrix to unite particles. There are three main divisions: (a) *Building cements*. See *Portland Cement*; *Plaster of Paris*. (b) *Bituminous cements*. These are largely composed of natural asphalt and pitch, and are used for damp courses and waterproofing to reservoirs and roads. (c) *Adhesives*. These include resinous cements (marine glue, shellac), oleaginous (linseed oil), and gelatinous (gum-arabic and the gelatin glues).

Cenci, Beatrice (1577-1599), Italian paricide, called the *beautiful*, the daughter of Francesco Cenci, a noble and wealthy Roman (1527-1598), who procured the assassination of two of his sons, and committed incest with Beatrice. She failed in an appeal for protection to the Pope, and planned and executed the murder of her father. She was beheaded in 1599, and the Cenci estates confiscated. She is the heroine of one of Shelley's most powerful plays, *The Cenci*.

Cenis, Mont, a mountain belonging to the Graian Alps, between Savoy and Piedmont, 11,755 feet high. It is famous for the winding road constructed by Napoleon I which leads over it from France to Italy, and for an immense railway tunnel which, after nearly fourteen years' labour, was finished in 1871. The tunnel does not actually pass through the mountain, but through the Col de Fréjus, about 15 miles to the south-west, where it was found possible to construct it at a lower level. The Mont Cenis Pass is 6765 feet above the level of the sea, whereas the elevation

of the entrance to the tunnel on the side of Savoy is only 3801 feet, and that on the side of Piedmont 4246 feet. The total length of the tunnel is 12,849 metres (nearly 8 miles).

Censors, two officers in ancient Rome whose business was to draw up a register of the citizens for the purposes of taxation; to keep watch over the morals of the citizens; and to superintend the finance administration and the keeping up of public buildings.

Census, an enumeration of the inhabitants of a country, accompanied by any other information that may be deemed useful. In Great Britain the first census was taken in 1801, and a census was taken every ten years from that date till 1931. In 1920 a Bill was passed, empowering the taking of a census every five years, and it was subsequently decided to adopt this course after 1931. The first census in France appears to have been that of 1700; since 1822 it has been taken every five years. The first census of the German Empire was taken in 1871, since when there has been a census every five years in Germany. In the United States of America, Switzerland, Sweden, Norway, Holland, Belgium, and Portugal, a census is taken every ten years.

Centaurs, in Greek mythology, fabulous beings represented as half man, half horse. The Centaur Nessus, Chiron, and others are famous in ancient fable.

Centaury, an annual herb of the gentian family with pretty red flowers, found in Northern Europe growing on sandy shores.

Centipede, a term applied to various air-breathing arthropods having many pairs of legs and a body consisting of numerous similar rings or segments, belonging to the order Chilopoda, class Myriapoda. The British centipede is quite harmless.

Centlivre, Susanna (1667–1723), English dramatic writer. She had some success as an actress, but her fame rests on *The Busybody*, *The Wonder*, *A Bold Stroke for a Wife*, and fourteen other plays, all of which were published in a collected edition, 1761.

Cento (Lat. a patchwork), a poem formed out of verses taken from one or more poets, so arranged as to form a distinct poem. Specimens of this form of perverted ingenuity may be found in the works of Ausonius.

Central Africa, a term of which the application is somewhat vague. It may be said to include the territory north of the Zambesi, south of the Ubangi, and running from the Albertine rift valley to the Atlantic. Within these limits are Northern Rhodesia, Nyasaland (both British), part of Portuguese East Africa, the Belgian Congo, and Angola. See *Africa*; *Rhodesia*; *Congo*; &c.

Central America, a geographical division, including the stretch of territory from the Isthmus of Panama to the Isthmus of Tehuantepec, but by political arrangements the limits most generally assigned to it include the five republican states of Guatemala, Honduras, San Salvador, Nicaragua, and Costa Rica, with British Honduras. It thus has Mexico on the north-west and Panama on the south-east. Its entire length may be about 800 miles, with a breadth varying from between 20 and 30 to 350 miles. It is generally mountainous, contains a number of active volcanoes, and on the whole is a rich and fertile but almost totally undeveloped region. A movement for federation in 1921 met with no success. The area is 188,999 sq. miles; the pop. 5,372,793.

Central Australia. See *Northern Territory*.

Central Falls, a town of the U.S.A., in Rhode Island. Pop. 24,174.

Central India Agency includes some 150 states. The Indian Government agent at Indore has under him political agents for Baghelkhand, Bhopal, Bundelkhand, Malwa, and the southern states of Central India. Area, 51,531 sq. miles; pop. 5,977,023.

Central Provinces and Berar, an extensive British territory in India. They became a separate administration in 1861, and are under the authority of a chief commissioner. Their total area is 131,052 sq. miles, of which 82,109 sq. miles are British territory, and 31,176 sq. miles the territory of native protected states, fifteen in number. Population of British territory, 10,837,444. The province is divided into five commissionerships, Jubbulpore, Nagpur, Nerbada, Chhattisgarh, and Berar, the last till 1903 a separate province.

Centres, in mechanics, are important points in a body with regard to forces acting upon it.—*Centre of buoyancy*, that point in a floating body through which the resultant upthrust of the water on it

acts; it is the centre of gravity of the water displaced.—*Centre of gravity*, that point of a body through which the line of action of the resultant of the weights of the particles composing the body passes.—*Centre of inertia*, a point of a body which moves as if the whole body were concentrated at that point, and the forces acted, with their directions unchanged, on the concentrated mass; virtually the same as centre of gravity.—*Centre of pressure*, in hydrostatics, that point of an immersed area through which the resultant water-pressure on one side of the area passes.

Centrifugal and Centripetal, in botany, terms applied to two kinds of inflorescence, the former being that in which the terminal or central flower is the first to expand, as in a true cyme (examples, elder and valerian), the latter being that kind in which the lower or outer flower is the first to expand, as in spikes, racemes, umbels, and corymbs. The laburnum, hemlock, and daisy are examples.

Centrifugal Force and Centripetal Force. It is a fundamental principle of dynamics that a body which is not subjected to the action of force moves with uniform velocity in a straight line. If, therefore, we observe a body moving in a curved path, even though its speed is uniform, we infer that some force is acting on it. Take the simple case of a small mass moving with uniform speed in a circle, a case which may be realized practically by whirling a stone at the end of a string. We note that the force acting on the stone, namely the tension of the string, is directed towards the centre of the circle, or is *centripetal*. The force which the stone exerts on the string, and through it on the hand, is equal and opposite to this, and tends to pull the string away from the centre. The force exerted by the stone on the string is therefore correctly described as *centrifugal*.

But it does not follow, as is sometimes erroneously supposed, that if the string were cut the stone would fly off in the direction of the force which it is exerting, that is, radially. It would continue to move in the straight line which it is following at the moment of release, that is to say, in the tangent to its circular path.

The actual value of the force on a mass m moving with uniform velocity v in a

circle of radius r is mv^2/r absolute units.

It is often convenient, when discussing problems of rotation, to deal with centrifugal rather than centripetal forces. For example, the proper amount of elevation of the outer rail of a railway curve, or the proper angle of banking of a cycle-track, is found from the consideration that the resultant of centrifugal force and weight must be at right angles to the plane of the rails or track.

As a last example, we may take the apparent loss of weight of a body due to the rotation of the earth. If the body is resting on the ground at the equator, the upward pressure of the ground and the upward centrifugal force together balance the attraction of the earth on the body, so that the pressure of the body on the ground, which is its *apparent* weight, is less than its real weight by the amount of the centrifugal force. It is easy to prove that the apparent loss of weight at the equator is about $1/289$ of the real weight.

Centrifugal Machines, machines in which centrifugal force produced by rapid revolution is utilized. They are used for drying articles, and for separating sugar from molasses, or milk from cream, &c.

Centuripe, a town of Sicily, province of Catania, situated in a fertile district yielding soda, sulphur, and marble. Pop. 13,100.

Cephalonia, an island of Greece, the largest of the Ionian Islands, at the entrance of the Gulf of Patras, about 31 miles in length; area, 256 sq. miles; pop. (1928), 66,414. The coast-line is irregular and deeply marked with indentations, and the surface is rugged and mountainous, rising in Monte Negro, the ancient Ænos, to a height of 5380 feet. There is rather a deficiency of water on the island. The principal towns are Argostoli (9000 inhabitants) and Lixuri (6000). The chief exports are currants, oil, and grain; wine, cheese, &c., are also exported. The manufactures are inconsiderable. Earthquakes are not infrequent.

Cephalopoda, or **Cephalopods**, a class of the mollusca characterized by having the organs of prehension and locomotion, called tentacles or arms, attached to the head and furnished with suckers. They are divided into two sections, *Tetrabranchiata* (four-gilled) and *Dibranchiata* (two-gilled).

Ceram, an island in the Moluccas, lying west of New Guinea; area, about 6621 sq. miles; pop. estimated at 100,000. It is about 200 miles long. Its interior is traversed by mountain ranges, but is little known. The vegetation is luxuriant, the sago-palm supplying the chief food of the inhabitants as well as an article of trade. The inhabitants of the coast are of Malay origin, the interior being peopled by Alfuros. It is under the Dutch.

Ceramics. See *Pottery*.

Cerberus, in classical mythology, the dog-monster of Hades, described as having three heads, with a serpent's tail, and a mane consisting of the heads of various snakes. The last of the twelve labours of Heracles (Hercules) was to fetch him from below to the upper world.

Cercaria, in flukes or trematodes, the final larval stage. See *Distomum*.

Cercopithecus, a genus of African monkeys, including the Guenons, one being the Diana monkey (*C. diana*), and another the Green Guenon (*C. sabaeus*).

Cerebro-spinal Fever (epidemic cerebro-spinal meningitis), known popularly as 'spotted fever', is an infectious fever found throughout Europe and America in sporadic form, but periodically breaking out in limited areas as an epidemic. The mortality is as high as from 50 to 70 per cent. The disease may be very acute (fulminant type), when death occurs within forty-eight hours after the onset, or it may be the more common and less severe form. The chief symptoms are vomiting, intense headache, stiffness of neck, convulsions, delirium, fever, insomnia, resentment of all handling, hæmorrhagic rash giving the skin a mottled appearance (hence the name 'spotted fever'). Sedatives should be given freely, and in all cases serum should be injected into the spinal canal.

Ceres, a Roman goddess, corresponding to the Greek *Dēmētēr*. She was the goddess of the earth in its capacity of bringing forth fruits, especially watching over the growth of grain and other plants.

Cerignola, a town of South Italy, in the province of Foggia. It has linen manufactures and a trade in almonds and cotton. Pop. 35,000.

Cerigo, a Greek island in the Mediterranean, south of the Morea, from which it is separated by a narrow strait; area, about 100 sq. miles. It is mountainous and barren, though some of the valleys are

fertile, producing corn, wine, and olives. Excellent honey is produced. Pop. about 10,000.

Cerium, a rare metal discovered in the mineral *cerite* by Klaproth in 1804. See *Mantle*; *Monazite*.

Cernauti, Romanian name of *Czernowitz* (q.v.).

Cerro de Pasco, a town of Peru, capital of the department of Junin, 14,275 feet above the level of the sea. The climate is trying and the whole place uninviting, though it contains the most productive of the Peruvian silver-mines. Pop. about 14,000.

Certaldo, a small town of North Italy, 15 miles south-west of Florence. Boccaccio was born there. Pop. 10,440.

Certiorari, in law, a writ issuing out of a superior court to call up the records of an inferior court or remove a cause there depending, that it may be tried in the superior court. This writ is obtained upon the complaint of a party that he has not received justice, or that he cannot have an impartial trial in the inferior court.

Ceruse, white-lead. See *Paints and Pigments*, under heading *Carbonates*.

Cerussite, a mineral lead carbonate (PbCO_3), common with galena in almost all lead-mines. Specific gravity, 6.5. It is readily reduced to lead before the blow-pipe.

Cervantes Saavedra, Miguel de (1547–1616), Spanish poet, playwright, and novelist. In the battle of Lepanto (1571) he lost the use of his left hand and received two gunshot wounds in the chest. In 1575 he was taken by a corsair and sold in Algiers as a slave. In 1580 his friends and relations at length ransomed him, and he fought at the storming of Terceira. In 1583, however, he retired from service and recommenced his literary work, publishing in 1584 his pastoral *Galatea*. He wrote for the stage between twenty and thirty plays, of which two only have survived. He did not appear again as an author till 1605, when he produced the first part of *Don Quixote*, one of the greatest of all books. It was originally intended to ridicule the romances of chivalry; but it has a far wider scope than any mere satire. The second part was published in 1614 as the most effective form of counterblast to a spurious continuation. In 1613 his twelve *Exemplary Novels* (his best work after *Don Quixote*)

appeared. His novel *Persiles and Sigismunda* was published after his death.—
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Cervin, Monte (Matterhorn), a mountain, Switzerland, Pennine Alps, on the southern frontiers of canton Valais, about 6 miles w.s.w. of Zermatt. It is an almost inaccessible obelisk of rock, starting up from an immense glacier to a height of 14,837 feet.

Cesarotti, Melchior (1730–1808), Italian poet. Besides his own poems, his works include translations of Voltaire's tragedies, Ossian, Demosthenes, and the *Iliad*, and essays on the *Philosophy of Languages*, on *Studies*, &c.

Cesena, a town of Central Italy, province of Forlì. It is noted for its wine, and also trades in hemp, silk, and sulphur. Pop. 46,445.

Cessio Bonorum, in Scots law, a yielding or surrender of property or goods—a legal proceeding by which a debtor surrenders his whole means and estate to his creditors.

Cetacea, an order of marine animals, including whales and dolphins. They are true mammals, since they suckle their young, have warm blood, and respire by means of lungs. The body is fish-like in form, but ends in a bilobate tail, which is placed horizontally. The fish-like aspect is further increased by the presence of a dorsal fin, but this is a simple fold of integument, and does not contain bony spines. Adult whales have no teeth, but plates of *baleen* or whalebone, which are developed on transverse ridges of the palate; but the foetal whales possess minute teeth. When it comes to the surface to breathe, it expels the air violently, and the vapour it contains becomes condensed into a cloud. The top of the windpipe is prolonged into a sort of cone that fits into the back of the nasal passages, and enables the animal to swim rapidly through the water with its mouth open, for the purpose of securing prey, without risk of suffocation. The blood-vessels in these animals break up into extensive plexuses or networks, in which a large amount of oxygenated blood is delayed, and they are thus enabled to remain a considerable time under water. The Cetacea are commonly divided into five families: (1) *Balaenidae*,

or whalebone whales, divided into two sections: smooth whales, with smooth skin and no dorsal fin, and furrowed whales, with furrowed skin and a dorsal fin; (2) *Physeteridae*, sperm-whales or cachalots, the palates of which have no baleen-plates, and which are furnished with teeth, developed in the lower jaw only; (3) *Delphinidae*, a family possessing teeth in both jaws, and including the dolphins, porpoises, and narwhal; (4) *Rhynchoceti*, a family allied to the sperm-whales, but having only a pair or two pairs of teeth in the lower jaw, a pointed snout or beak, a single blow-hole, &c.; (5) *Zeuglodontidae*, an extinct family, distinguished from all the tooth-bearing whales by the possession of molar teeth implanted by two distinct fangs, &c.

Ceterach, a genus of ferns, sub-order Polypodiaceæ. One species, *C. officinarum* (the scale-fern or milrtaste), is indigenous to Britain, and common on rocks and walls.

Cetewayo (? 1820–1884), Kaffir chief or king, son of Panda, King of the Zulus. Cetewayo became king in 1873. Great Britain declared war on Zululand over a boundary dispute in 1879. Cetewayo was crushed at Ulundi in 1879, restored to his kingdom in 1882, and driven out by Usibepu in 1883. He died in the Native Reserve.

Cetinje, formerly capital of Montenegro, which is now part of Yugoslavia. It commands a good strategic position. Pop. 5500.

Cette, a fortified seaport, France, department of Hérault, exporting superphosphates, salt, wine, brandy, and fruit. After Marseille, Cette is the principal trading port in the south of France, and is much resorted to as a watering-place. There is accommodation for vessels drawing 24 feet. Pop. 34,500.

Ceuta, a strongly-fortified seaport in Morocco, possessed by the Spaniards, on a peninsula of the African coast opposite Gibraltar. The quay depth is at present 30 feet, but when the new harbour is finished it will be 45 feet. Ceuta is used as a place of transportation for criminals. Pop. 23,907.

Cevennes, a chain of mountains in the south-east of France, in the widest sense extending from the Pyrenees in the south-west to the Vosges in the north-east. The length of the chain, exclusive of the Côte d'Or, is about 330 miles, the average

height not more than 3000 feet. It is divided into two sections, the Northern and Southern Cevennes; the dividing-point is Mount Lozère, in the department of the same name, 5582 feet high. The highest peak is Mezenc, 5753 feet. The Cevennes form the watershed between the Bay of Biscay and the Mediterranean, separating the basins of the Garonne and Loire from those of the Rhone and Saône. They are rich in minerals, containing mines of copper, iron, lead, and coal, and quarries of granite, porphyry, marble, and plaster. The Cevennes were the scene of the persecution of the Camisards (q.v.).

Ceylon, a pear-shaped island belonging to Great Britain, situated in the Indian Ocean, and separated from the south coast of India by the Gulf of Manaar and Palk Strait. Stretching across Palk Strait is a chain of sandbanks known as Adam's Bridge, which makes navigation dangerous for all except the smallest ships. The breadth of the strait is only 20 miles, and on either shore is a terminus of the Indo-Ceylon Railway. The length of the island is 270 miles, its greatest breadth 137 miles, and its area 25,327 sq. miles. The coast, though irregular, has only two good natural harbours, Trincomalee in the north-west and Galle on the south. Both of these ports have now yielded pride of place to Colombo, which has a magnificent artificial harbour. There are sixteen rivers in Ceylon, varying in length from 60 to 200 miles. The largest is the Mahaweli Ganga, which enters the sea at Trincomalee. The Kelani flows through Colombo. The mountain regions are in the centre and south of the island. The highest mountain is Pidurutalagala (8292 feet), though the most interesting is Adam's Peak (7360 feet), to which there is an annual Buddhist pilgrimage. The climate of Ceylon is, for a tropical country, comparatively healthy. The heat is never so intense as in India, and though there are regular rainy seasons, there is hardly a month when some rain does not fall. Most of the animals found in India are native to the island, the tiger being the only notable exception. Elephants are particularly numerous, and bears, buffaloes, leopards, &c., abound. The vegetation of the island is most luxuriant, and, indeed, the prosperity of Ceylon depends on the vegetable products, which include tea, rubber, coco-nuts, cacao,

cinnamon, and tobacco. For local consumption paddy, dry-grains, vegetables, and fruit are grown. The total area under cultivation is over 4,000,000 acres. The coco-nut industry, to which 1,000,000 acres are devoted, is in a very flourishing condition. Rubber is also becoming of increasing importance, though both industries have of late years taken away land once used for other products. Tea is the chief plantation industry. The quality of Ceylon tea is rapidly improving, prices are good, and extensions are being made. Coffee, once extensively grown, is now little cultivated owing to leaf disease. Ceylon cacao is of good quality and commands a high price, but supplies are not large. There is still much room for agricultural development in Ceylon, and land suitable for sugar-cane, cotton, and sisal-hemp is available. The forests, which are situated in the plains at the foot of the mountains in the centre and in the south-west, yield valuable timber, ebony and satin-wood being the most important varieties. Minor forest products include gall-nuts, honey, and bees-wax. Industries, apart from those connected with agriculture, are unimportant, and are the making of baskets, coir rope, brass and silver work, and tortoise-shell goods. Fisheries are fairly good, and the pearl-fishing in the Gulf of Manaar has been especially profitable. Salt, a Government monopoly, is produced by solar evaporation. The principal mineral found in Ceylon is plumbago or graphite, great quantities of which were used for munitions during the European War. Gems are also mined, and include rubies, sapphires, and topazes. The island has nearly 1000 miles of railway track, 4000 miles of metalled roads, and 8000 miles of gravelled cart roads. There are 150 miles of canals, and a fortnightly coastal steamship service is maintained by the Government. Ceylon possesses great possibilities for producing cheap electrical energy from water-power, and various schemes are being considered. The standard currency is the Indian rupee (Rs. 15 = £1 sterling). The chief exports are tea, rubber, cacao, and coco-nut products, the total annual value being £30,000,000. The chief port is Colombo. The first European settlement in Ceylon was effected at Colombo in 1517 by the Portuguese. They established a fort here, and in a few years had appropriated the

whole of the west coast. In 1638 the Dutch attacked various settlements, and by 1658 the Portuguese had been driven out. The British captured the Dutch strongholds in 1795, and the island was administered by the East India Company till 1802, when the seaboard became a Crown colony. Eventually the whole island was given over to the British in 1815. The island, being a Crown colony, is under a Governor and two Legislative Councils, and is divided into nine provinces. The population at present consists of Singhalese (3,000,000 Ceylonese proper), Tamils from India (1,000,000), Moors, Malays, Veddahs, and Europeans (8000); total, 4,497,854. Buddhism prevails in the interior and among the Singhalese on the coast, many of whom, however, are Roman Catholics. Education is under a separate Government department.—BIBLIOGRAPHY: *Colonial Office List* (annual); *Times of Ceylon Green Book* (annual); S. M. Burrows, *The Buried Cities of Ceylon*; G. E. Mitton, *The Lost Cities of Ceylon*.

Chad, a colony of French Equatorial Africa. Large herds of camels, horses, ostriches, and sheep are raised. Area, 398,955 sq. miles; pop. (1926), 973,611.

Chad, Lake, a freshwater lake of Central Africa, the nodal point of the French-African and Nigerian frontiers. The area is about 7000 sq. miles, but this varies according to the season. Certain parts of the shore and the numerous islands with which it is studded are densely populated. There is no outlet.

Chæroneia, an ancient Greek town in Bœotia, famous as the scene of a battle fought 338 B.C., when Philip of Macedon crushed the liberties of Greece.

Chaffinch, a common British bird of the finch family, which feeds on the larvæ of insects, builds in the forks of trees, and has five or six greenish eggs with purple markings. The male is a prettily-marked bird about 6 inches long.

Chagos Islands, a group of islands in the Indian Ocean, south of the Maldive Islands, forming a dependency of Mauritius. See *Diego Garcia*.

Chalcedon, a Greek city of ancient Bithynia, opposite Byzantium (Constantinople), at the entrance of the Black Sea.

Chalcedony, a mineral form of silica, resembling quartz in hardness and specific gravity. Its colour is grey and milky; but it is often stained by impurities, as

in the fine apple-green *chrysoprase*, the red *sard*, and the dull-red, brown, or green varieties collectively styled jasper. *Bloodstone* or *heliotrope* is a green chalcedony spotted with red iron oxide.

Chalcis, a Greek town, anciently the chief town of Eubœa (q.v.), separated by the narrow Strait of Euripus from the mainland of Greece, with which it was connected by a bridge. Chalcis early became one of the greatest of the Ionian cities, carrying on an extensive commerce, and planting numerous colonies in Syria, Macedonia, Italy, Sicily, and the islands of the Ægean Sea. It was subsequently a place of importance under the Romans. It was prosperous under the Venetians, who held it for three centuries in the Middle Ages, until its conquest by the Turks in 1470. There is still a town on the site. A bridge, so constructed as to let vessels pass through, connects it with the mainland. Pop. about 13,466.

Chalcopyrite. See *Copper Pyrites*.

Chaldæa, in ancient geography, the southerly part of Babylonia, or in a wider sense corresponding to Babylonia itself.

Chaldee Language, a name often given to the Aramaic language. Portions of the Old Testament are written in Chaldee, namely, *Daniel*, from ii, 4 to vii, 28; *Ezra*, iv, 8 to vi, 18; and vii, 12-26; and *Jer.* x, 11.

Chaleur Bay, an inlet of the Gulf of St. Lawrence, between Quebec and New Brunswick.

Chalk, a pure soft limestone, opaque white, and usually formed by the accumulation of the shells of foraminifera, together with those of larger marine organisms. It is one of the purest forms of calcium carbonate in a massive state, and in Europe constitutes thick beds in the Upper Cretaceous series. The white cliffs of Southern England and North-Western France, the North and South Downs, and Salisbury Plain afford notable examples of its effect on landscape. Artificial chalk is used for drawing.

Challenger Expedition, a circumnavigating voyage for scientific purposes, organized in 1872 by the British Government on the lines of those carried out by the *Lightning* in 1868 and the *Porcupine* in 1870. Those on board included Captain Nares as head of a nautical surveying staff, and Professor (later Sir) Wyville Thomson, with scientific assistants. The

results of the expedition were fully recorded in the *Reports on the Scientific Results of the Voyage of H.M.S. Challenger*, which, edited by Sir Wyville Thomson and Sir John Murray, filled 50 vols. See *Oceanography*.—Cf. H. N. Moseley, *A Naturalist on the Challenger*.

Chalmers, Alexander (1759–1834), British journalist, editor, and miscellaneous writer. He edited the *British Essayists* (from the *Tatler* to the *Observer*), published 1803. He also edited the works of the English poets from Chaucer to Cowper, with Johnson's *Lives*, and additional *Lives* in 1810. His most extensive work was the *General Biographical Dictionary*, 32 vols., 1812–1817.

Chalmers, George (1742–1825), Scottish antiquary. In 1790 he published his life of Daniel Defoe, and in 1794 his life of Thomas Ruddiman. In 1800 he edited the works of Allan Ramsay, and in 1806 the writings of Sir David Lyndsay; but his chief work was his *Caledonia*, of which the first volume was published in 1807, a laborious historical and topographical account of Scotland. The complete work was published in 7 vols., 1888–1893.

Chalmers, Thomas (1780–1847), Scottish divine. He was educated at St. Andrews and Edinburgh, and in 1803 was presented to the parish of Kilmarnock, in Fife. In 1808 he published an *Inquiry into the Extent and Stability of National Resources*. In 1813 his article on Christianity appeared in the *Edinburgh Encyclopedia*. In 1815 he was inducted to the Tron Church of Glasgow. In 1819 he was transferred to St. John's, a church built and endowed expressly for him by the Town Council of Glasgow, but his health having been tried by overwork he accepted, in 1823, the chair of moral philosophy at St. Andrews. In 1827 he was elected to the divinity chair in the University of Edinburgh. In 1832 he published his *Political Economy*, and shortly afterwards his Bridgewater Treatise *On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man*. Throughout the whole contest to the disruption in 1843, he acted as the leader of the party that then separated from the Establishment, and may be regarded as the founder of the Free Church of Scotland, of the first assembly of which he was Moderator. Having vacated his professorial chair in Edinburgh University, he

was appointed principal and primarius professor of divinity in the new college of the Free Church.—**BIBLIOGRAPHY:** Mrs. Oliphant, *Thomas Chalmers: Philosopher and Statesman*; W. G. Blaikie, *Thomas Chalmers*; Fraser, *Thomas Chalmers*; Dr. W. Hanna, *Memoirs*.

Châlons-sur-Marne, a city of France, capital of the department Marne, on the right bank of the River Marne. There are manufactures of woollen and cotton goods; also cotton-mills, tanneries, &c. It was known to the Romans as *Catalauni*, and in 451 Attila was defeated before the walls of Châlons (Catalaunian Fields). From the tenth century it flourished as an independent state under counts-bishops, having about 60,000 inhabitants. After being united to the French Crown in 1360, it declined. Pop. 31,367.

Chalon-sur-Saône, a town of France, department of Saône-et-Loire, on the right bank of the Saône, which here becomes navigable for steamboats, and at the commencement of the Canal du Centre. There are foundries, dyeworks, &c., and a flourishing trade. Pop. 31,550.

Chalybite. See *Siderite*.

Chamærops, a genus of palms belonging to the northern hemisphere, and consisting of dwarf trees with fan-shaped leaves borne on prickly petioles, and a small berry-like fruit with one seed. The *C. humilis* is the only native European palm. It does not extend farther north than Nice. The fibres of its leaves form an article of commerce under the name of *crin végétal* (vegetable hair).

Chamalari, a peak of the Himalaya Mountains, at the western extremity of the boundary line between Bhutan and Tibet. Height, 23,940 feet.

Chamba, a Punjab hill state, south-east of Kashmir; area, 3216 sq. miles; pop. 141,867. Agriculture and grazing are the main occupations of the people. Iron, copper, and slate are found, and there is game shooting in the mountains. The state is under a native rajah.

Chamberlain, Arthur Neville (1869–), British politician, second son of Rt. Hon. Joseph Chamberlain, was educated at Rugby and Mason College, Birmingham. He was Director-General of National Service 1916–1917, Postmaster-General 1922–1923, and Minister of Health in 1923. He succeeded Mr. Baldwin as Chancellor of the Exchequer in 1923,

and was Minister of Health 1924-29, returning to the Exchequer in 1931.

Chamberlain, Sir Austen (1863-), British politician, eldest son of Rt. Hon. Joseph Chamberlain, was educated at Rugby and Trinity College, Cambridge. He entered Parliament as Liberal-Unionist member for East Worcestershire in 1892, and was Civil Lord of the Admiralty from 1895 to 1900. In 1900 he became Financial Secretary to the Treasury, in 1902 Postmaster-General, and in 1903 Chancellor of the Exchequer. He returned to office as a Coalitionist in 1915. He was Secretary of State for India 1915-1917, a member of the War Cabinet 1918-1919, Chancellor of the Exchequer 1919-1921, and became Lord Privy Seal and Leader of the House of Commons in March, 1921. He went out of office in 1922, but was Secretary of State for Foreign Affairs from Nov., 1924, to June, 1929. When the Locarno Pact was signed (1925) he was made K.G. He received the Nobel prize in 1926.

Chamberlain, Joseph (1836-1914), British statesman. In 1876 he entered Parliament as a representative of Birmingham. Under Gladstone's premiership he became President of the Board of Trade and a Cabinet Minister, and was able to pass the Bankruptcy Act. In the Gladstone Government of 1886 he was President of the Local Government Board; but his leader's Irish policy caused him to resign, and afterwards he was one of the most pronounced members of the Liberal-Unionist party. He was Colonial Secretary from 1895 to 1903, when he resigned in order to be able to advocate more freely his policy of fiscal changes and tariff reform. He failed, however, in his endeavours, as protection did not appeal to the majority of the nation. He was seized by severe illness in 1906, and from that time till his death was unable to take any active part in public life.—**BIBLIOGRAPHY:** S. H. Jeyes, *Mr. Chamberlain: his Life and Public Career*; L. Creswicke, *Life of Joseph Chamberlain*; A. Mackintosh, *Joseph Chamberlain*.

Chamberlain. The *Lord Chamberlain* or *Lord Great-Chamberlain* of Great Britain is the sixth officer of the Crown. His functions include the dressing and attending on the king at his coronation, the care of the palace of Westminster, and attending upon peers at their creation. The *Lord Chamberlain of the Household*

has the control of all parts of the household which are not under the direction of the Lord Steward, the groom of the stole, or the Master of the Horse. The companies of actors at the royal theatres are under his regulation; and he is also the licenser of plays.

Chambers, Charles Haddon (1860-1921), British playwright. Among his best plays are: *John-a-Dreams* (1894), *The Tyranny of Tears* (1899), *The Awakening* (1901), and *Passers-By* (1911).

Chambers, Ephraim (d. 1740), English miscellaneous writer. The first edition of his *Cyclopaedia* was published in 1728. Several subsequent editions appeared previously to his death, and it was the basis of the *Cyclopaedia* of Dr. Abraham Rees.

Chambers, Robert (1802-1871), Scottish historical and miscellaneous writer, the younger of two brothers originally composing the publishing firm of W. & R. Chambers. His *Illustrations of the Author of Waverley* and his *Traditions of Edinburgh* (1823) won a ready popularity, as did his *Popular Rhymes of Scotland* (1827), *Picture of Scotland* (1827), *Histories of the Scottish Rebellions*, and a *Life of James I.* He next edited *Scottish Ballads and Songs*, a *Biographical Dictionary of Eminent Scotsmen*, and on the 4th of Feb., 1832, in conjunction with his brother William, he commenced *Chambers's Edinburgh Journal*, which achieved an immense success. He also edited the *Cyclopaedia of English Literature*, the *Domestic Annals of Scotland*, *Ancient Sea-Margins*, and the *Book of Days*. His name was long associated with the authorship of the famous *Vestiges of Creation*, but it was not known to be really his till years after his death.

Chambers, William (1800-1883), brother of the above, wrote *Things as they are in America*; *History of Peeblesshire*; *France: its History and Revolutions*; *Memoir of Robert Chambers, with Autobiographic Reminiscences*; &c. He was twice Lord Provost of Edinburgh, and bore the expense of restoring the old church of St. Giles, Edinburgh.

Chambersburg, a town, United States of America, Pennsylvania, in a fertile and populous district. Pop. 13,000.

Chambéry, a town of South-East France, capital of department of Savoie. In its vicinity are excellent baths, much frequented in summer. It has manu-

factures of silk, gauze, and lace, and distilleries. Pop. 22,958.

Chambord, Henri Charles Ferdinand Marie Dieudonné, Comte de, Duc de Bordeaux (1820–1883), the last representative of the elder branch of the French Bourbon dynasty. He was born seven months after the assassination of his father, Prince Charles Ferdinand d'Artois, Duc de Berry. Charles X, after the revolutionary outbreak of 1830, abdicated in his favour; but the count was never recognized as king by the nation. He lived successively in Scotland, Austria, Italy, and London.

Chambre Ardente, a French court of justice which met in an apartment hung with black and lighted with tapers, and which pronounced sentence of death on heinous offenders. The name was afterwards more especially given to those extraordinary tribunals which, from the time of Francis I, ferreted out heretics and pronounced and carried out the sentence against them.

Chameleon, a genus of reptiles belonging to the Saurian or lizard order, a native

branches. The skin is cold to the touch, and contains small grains or eminences of a bluish-grey colour in the shade, but in the light of the sun all parts of the body become of a greyish-brown or tawny colour. It possesses the faculty of changing its colour, either in accordance with its environment, or with its temper when disturbed.

Chamfort, Sebastien-Roch Nicolas (1741–1794), French man of letters, wit, and revolutionist. He threw himself heartily into the Revolution, but his cynical wit got him into trouble, and rather than face imprisonment he inflicted fatal injuries upon himself. He is seen at his best in the collection of *bon mots* published under the title of *Chamfortiana*.

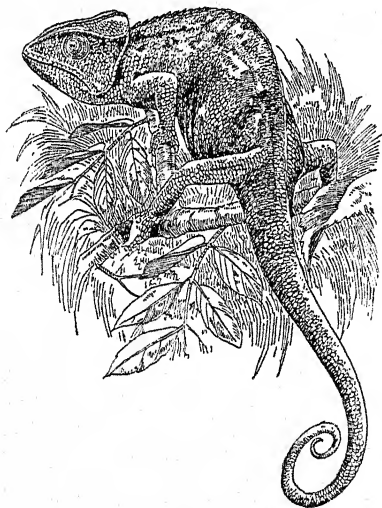
Charnade, Cécile (1861–), French musical composer. She has given a series of recitals of her compositions in London and the provinces, as well as in America. Her compositions, which have been widely popular, include a large number of works for piano solo, piano and violin, &c., besides many songs.

Chamisso, Adelbert de (1781–1838), German poet, French by birth. Between 1804 and 1806, in concert with Varnhagen von Ense, he published a collection of poems under the name of the *Muses' Almanac*; and in 1813 appeared his famous tale *Peter Schlemihl*, the man who sold his shadow, the plot suggested by a casual question of Fouqué's. Many of his ballads and songs are masterpieces in their way and still maintain their popularity.

Chamois, a goat-like antelope with small horns and hair which changes colour according to the seasons, inhabiting the mountainous districts of Europe and Western Asia. They live in herds, are extraordinarily agile, and have a very keen sense of smell. The original 'shammy' leather was made from their skin.

Chamomile, or **Camomile**, a well-known European plant belonging to the nat. ord. Compositæ. It is perennial, and has slender, trailing, hairy, and branched stems. Both the leaves and the flowers are employed in fomentations and poultices, and also in the form of an infusion as a stimulant or anti-spasmodic.

Chamonix (*Chamouni*), a valley in France, department of Haute-Savoie, in the Pennine Alps, over 3000 feet above



Chameleon

of parts of Asia, Africa, and the south of Europe. The best-known species, *Chamaeleo africanus* or *C. vulgaris*, is 6 or 7 inches long, with a prehensile tail of about 5 inches, and feet suitable for grasping

sea-level. It is about 12 miles long by 1 to 6 miles broad, its east side formed by Mont Blanc and other lofty mountains of the same range. The mountains on the east side are always snow-clad, and from these proceed numerous glaciers, such as the Glacier de Bossons and the Mer de Glace.—The village of Chamonix (pop. 1500) is much frequented by tourists, and is one of the points from which they visit Mont Blanc.

Champagne, an ancient province of France, which before the Revolution formed one of the twelve great military governments of the kingdom. It forms at present the departments of Marne, Haute-Marne, Aube, Ardennes, and part of those of Yonne, Aisne, Seine-et-Marne, and Meuse. Troyes was the capital.

Champagne. See *Wines and Spirits*.

Champaign, a town of Illinois, U.S.A., with furniture- and wagon-factories, and an industrial university. Pop. 15,813.

Champarty, or Champerty, in law, is a bargain with the plaintiff or defendant in any suit to have part of the land, debt, or other thing sued for, if the party that undertakes it prevails therein; the champertor meanwhile furnishing means to carry on the suit. Such bargains are illegal.

Champlain, Samuel (1567 - 1635), French maritime explorer. After three voyages to North America, in the last of which he founded Quebec, he was in 1620 appointed Governor of Canada. He wrote an account of his voyages.

Champlain, Lake, a lake, chiefly in the United States of America, between New York and Vermont, but having the north end of it in Canada; extreme length, north to south, about 120 miles; breadth, from half a mile to 15 miles; area, about 600 sq. miles. It is connected by canal with the Hudson River.

Champollion, Jean François (1790-1832), French Egyptologist. With the aid of the trilingual inscription of the Rosetta Stone and the suggestions thrown out by Dr. Thomas Young, he discovered the key to the graphic system of the Egyptians. His results were published in 1824 at the expense of the State, under the title of *Précis du Système Hiéroglyphique des Anciens Égyptiens*. Other works are his *Grammaire Égyptienne*, *Dictionnaire Hiéroglyphique*, and *Panthéon Égyptien*.

Champollion-Figeac, Jacques Joseph

(1778-1867), French archaeologist, elder brother of the preceding. His principal works are: *Antiquités de Grenoble* (1807), *Paléographie Universelle*, *Annales des Lagides* (1819), *Traité élémentaire d'Archéologie* (1843), *Écriture démotique Égyptienne* (1843), *L'Égypte Ancienne* (1850).

Chancellor. The Lord High Chancellor of Great Britain, who is also Keeper of the Great Seal, is the first judicial officer of the Crown, and ranks as first *lay* person of the State after the blood royal. Originally the sole administrator of equity, he was subsequently assisted as a judge in Chancery by the Master of the Rolls, and latterly also by three vice-chancellors down to the creation of the Supreme Court of Judicature, of which he is the head. A cabinet minister and a privy councillor in virtue of his office, he is Prolocutor of the House of Lords by prescription, with a total salary of £10,000 a year, and he is entitled to a pension of £5000 a year. He vacates his office with the ministry which appoints him and of which he is a member. He has the nomination of all judges of the High Court of Justice, and (except in the County Palatine of Lancaster) appoints all judges of county courts and justices of the peace. He is Keeper of the King's Conscience, visitor in the King's right of all foundations, guardian of all charitable uses, and of lunatics and of infants, and exercises considerable ecclesiastical patronage.

The Chancellor of the County Palatine of Durham is a barrister who is necessarily a leading member of the north-eastern circuit. He has unlimited chancery jurisdiction within the county palatine, and his duties are judicial merely, there being, it is believed, no appointment in his gift other than of the officers of the court.

The Chancellor of the Exchequer has one judicial appearance in each year where he sits at the Royal Court of Justice in London to settle the list of persons who are able and qualified to fill the costly office of High Sheriffs for their respective counties, see *Exchequer*.

Chancery, formerly the highest court of justice in England next to Parliament, but since 1873 a division of the High Court of Justice, which is itself one of the two departments of the Supreme Court of Judicature (q.v.). The Chancery Division consists of the Lord Chancellor as president and five justices. The matters of

which it specially takes cognizance are such as the administration of the estates of deceased persons, partnerships, mortgages, trust estates, rectification or setting aside of deeds, contracts in regard to real estates and wardship of infants and care of their estates.

Chanda, a town of India, Central Provinces, with manufactures of silk, cotton, and brass, and a considerable trade. Pop. 19,866.—The *District* has an area of 10,785 sq. miles, and a pop. of 677,544.

Chandausi, a town of India, United Provinces, Moradabad district. It has an extensive trade in sugar, and there are limestone quarries in the vicinity. Pop. 25,711.

Chandernagore, a town in India, belonging to France, on the right bank of the Hooghly, practically a residential suburb of Calcutta. It was established by the French in 1676, and after a great deal of trouble with the British was recognized in 1816. Pop. 25,153.

Chandpur, a town of India, Bijnaur district, United Provinces. Pop. 12,255.

Chang-Chow-Foo, a city, China, province of Fukien, 36 miles south-west of Amoy, which is its port. It is the centre of the silk manufacture of the province. Pop. estimated at 1,000,000.

Chang-chun. See *Kwangchengtze*.

Ch'angsha, a city of China, province of Hunan. It manufactures silk, matches, and tin-plate. Pop. 500,000.

Channel Islands, a group of islands in the English Channel. They belong to Britain, and consist of Jersey, Guernsey, Alderney, and Sark, with some dependent islets. They are not bound by Acts of the Imperial Parliament unless specially named in them. They are almost exempt from taxation, and their inhabitants enjoy all the privileges of British subjects. The government is in the hands of bodies called the 'states', some members of which are named by the Crown, while others are chosen by the people, and others sit *ex officio*. The islands have been fortified at great expense. They form the only remains of the Norman provinces once subject to England. Area, 95 sq. miles; pop. (1931), 93,061. See the separate articles.—**BIBLIOGRAPHY**: E. E. Bicknell, *The Channel Islands*; Wimbush and Carey, *The Channel Islands*.

Channing, William Ellery (1780–1842), American preacher and writer. He pro-

pagated Unitarian tenets with great zeal and success.

Chantabun, a seaport of Siam, with exports of timber and other articles. There are ruby- and sapphire-mines in the neighbourhood. Pop. 7000.

Chantilly, a town, France, department of the Oise, 25 miles N.N.E. of Paris, celebrated for a variety of lace made here and in the neighbourhood. It is a horse-racing centre, noted for its three annual race-meetings. Pop. 5556.

Chantrey, Sir Francis (1781–1842), English sculptor. His most celebrated works are the *Sleeping Children*, in Lichfield Cathedral; the statue of Lady Louisa Russell, in Woburn Abbey; the bronze statue of William Pitt, in Hanover Square, London; a statue of Washington, in the States House, Boston; statues of Horner, Canning, and Sir J. Malcolm, in Westminster Abbey; and the statues of George III, in the Guildhall, and of George IV, in Trafalgar Square. He left a fund of £105,000 to the Royal Academy "for the purchase of British works of art" (Chantrey bequest).

Chao-Chow, a city, China, province of Kwangtung, on the River Han, 195 miles north-east of Hongkong, the centre of an important maritime division of the province. Pop. 200,000. Bwato (16 miles distant) is its port.

Chapala, a picturesque lake of Mexico, states of Xalisco and Michoacan. Area, 1400 sq. miles.

Chap-books, a species of cheap literature which preceded the popular periodicals of the present day. They usually consisted of coarsely printed (and often coarsely written) publications sold for a copper or two, and were so called because they were prepared by the popular publishers expressly for sale by the chapmen or pedlars, who hawked them from district to district. They included lives of heroes and wonderful personages, tales of roguery and broad humour, witch and ghost stories, &c. They were issued in London, Edinburgh, Newcastle-on-Tyne, Glasgow, Falkirk, and Paisley.—Cf. J. Ashton, *A History of the Chap-books of the Eighteenth Century*.

Chapel-en-le-Frith, a market town in Derbyshire, with manufactures of cotton, paper, &c.; a tourist centre for the Peak country. Pop. (rural district, 1931), 17,758.

Chapman, George (1559–1634), Eng-

lish poet. He was educated at Oxford, and in 1576 proceeded to London; but little is known of his personal history. His translation of the *Iliad* was published as follows: Books 1, 2, 7, 8, 9, 10, 11 in 1598; 18 (Achilles' Shield), 1598; Twelve Books of *Iliad*, 1609; complete *Iliad*, 1611. In 1614 appeared his translation of the *Odyssey*, followed in the same year by that of the *Battle of the Frogs and Mice* and the Homeric hymns. He also translated Hesiod's *Works and Days* and portions of various classic poets. He wrote numerous plays, almost all now forgotten, though containing some fine passages. Chapman is chiefly remembered for his rugged but mighty-mouthed rendering of 'the strong-winged music of Homer', and for having been, in all probability, the rival poet mentioned in the *Sonnets* of Shakespeare. *All Fools* is perhaps the best of his comedies; his French tragedies, *Bussy d'Ambois* and the double tragedy of *The Conspiracy and Tragedy of Charles Duke of Byron*, are full of fiery energy and richness of phrase and imagery, but are lacking in truly dramatic qualities. Chapman's whole intellectual life was governed by his admiration for Homer, and when he wrote drama its excellences were those of epic poetry. His complete works, edited by Shepherd, with an essay by Swinburne, appeared in 1874.

Chapoo, a seaport, China, province of Chekiang. It carries on a considerable trade with Japan.

Chaprah, a town, Patna division, Bengal, India, on the Gogra, about a mile above its confluence with the Ganges. It has an active trade in cotton, sugar, and saltpetre. Pop. 42,473.

Char, a freshwater fish of the salmon family, somewhat resembling a trout in appearance, though slightly longer and more slender, with brighter colouring. It is found in the deep mountain lakes of Switzerland and the British Isles. Its flesh makes good eating.

Characeæ, or **Charophyta**. See *Stone-works*.

Charcoal, a term applied to an impure variety of carbon, especially such as is produced by charring wood. One kind of it is obtained from bones (see *Bone Black*); lamp-black and coke are also varieties. Wood-charcoal is manufactured by the partial combustion of wood piled in heaps, with air-spaces between, and

covered with turf. Water and various combustible materials are driven off, and impure carbon retaining the original structure of the wood is left. The more modern method is to heat the wood in closed retorts, when, in addition to the charcoal which is left behind, various volatile products of importance are obtained; among these are a combustible gas, wood-spirit, pyroligneous acid, and wood-tar. Charcoal can be made from any kind of wood, but the finest quality, used for making gunpowder, is that furnished by the alder-buckthorn and dogwood shrubs, and by alder. Wood-charcoal, well prepared, is of a deep-black colour, brittle and porous, tasteless and inodorous. It is combustible at high temperatures, cannot be fused in any flame or furnace, but is volatilized at the high temperature of the electric arc, presenting a surface with a distinct appearance of having undergone fusion. Charcoal is insoluble in water, and is not affected by it at low temperatures; hence, wooden stakes which are to be immersed in water are often charred to preserve them, and the ends of posts stuck in the ground are also thus treated. Owing to its peculiarly porous texture, charcoal possesses the property of absorbing considerable volumes of air or other gases at ordinary temperatures, and of yielding the greater part of them when heated. Charcoal likewise absorbs the odoriferous and colouring principles of most animal and vegetable substances, and hence is a valuable deodorizer, disinfectant, and decorolizer. It is used as a smokeless fuel in stoves, &c., as a reducing agent in metallurgical operations, e.g. for obtaining metals from their oxides, and for converting wrought iron into steel by the process of cementation. It is an important component of ordinary gunpowder, and is used in domestic filters.

Charcot, Jean Martin (1825-1893), French physician. In 1862 he began his work at the Salpêtrière, chiefly in connexion with nervous diseases, and his researches in hypnotic suggestion were very remarkable. His works include: *Leçons sur les maladies du système nerveux*, *Leçons sur les maladies du foie, des voies biliaires et des reins*, &c.

Chardin, Sir John (1643-1713), French traveller. Sent by his father to the East Indies to buy diamonds, Chardin resided a number of years in Persia and India,

and subsequently published an account of his travels in 4 vols. (1686-1711).

Charente, a river in Western France, rising in the department of Haute-Vienne, and falling into the sea about 8 miles below Rochefort, opposite to the Isle of Oléron.

Charente, an inland department of France, traversed by the River Charente; area, 2305 sq. miles; capital, Angoulême. Soil generally thin, dry, and arid; one-third devoted to tillage, a third to vineyards, the remainder being meadows, woods, and waste lands. The wines are of inferior quality, but they yield the best brandy in Europe, the celebrated cognac brandy being made in Cognac and other districts. Pop. (1926), 312,790.

Charente-Inferieure, a maritime department of France, area, 2791 sq. miles. Surface in general flat; soil chalky and sandy, fertile, and well cultivated; a considerable portion planted with vines; salt marshes along the coast. The pastures are good, and well stocked with cattle, horses, and sheep. Oysters and sardines abound on the coast. La Rochelle is the capital. Pop. (1926), 417,789.

Charenton-le-Pont, a town of France, about 5 miles east of Paris, at the confluence of the Marne with the Seine, with numerous mercantile and manufacturing establishments. Pop. 19,499.

Chariot. Ancient chariots, such as those used among the Egyptians, Assyrians, Greeks, and Romans, were of various forms. A common form was open behind and closed in front, and had only two wheels. In ancient warfare chariots were of great importance. The sculptures of ancient Egypt show that the chariots formed the strength of the Egyptian army, these vehicles being two-horsed and carrying the driver and the warrior, sometimes a third man, the shield-bearer. We have also numbers of sculptures which give a clear idea of the Assyrian chariots. These resembled the Egyptian in all essential features. War-chariots had sometimes scythe-like weapons attached to each extremity of the axle, as among the ancient Persians and Britons. Among the Greeks and Romans chariot-races were common.

Charitable Trusts. The system of charitable trusts and the method of administering them in England is now based upon a series of statutes known as the

Charitable Trusts Acts, passed in 1853, 1855, 1860, 1869, and 1888, and upon the Mortmain and Charitable Uses Act, passed in 1891. A body of commissioners (the Charity Commissioners), under whose superintendence such benevolent trusts are placed, was established under the Charitable Trusts Act of 1853.

Charjui, a town of Bukhara, situated at the point where the Transcaspian Railway crosses the Oxus by a great bridge.

Charlemagne (742-814), King of the Franks, and subsequently Emperor of the West. His father was Pepin the Short, King of the Franks, son of Charles Martel. On the decease of his father, in 768, he was crowned king. His first great enterprise was the conquest of the Saxons, which he undertook in 772; but it was not till 803 that they were finally subdued. While he was combating the Saxons, Pope Adrian implored his assistance against Desiderius, King of the Lombards. Charlemagne immediately marched with his army to Italy, took Pavia, overthrew Desiderius, and was crowned King of Lombardy with the iron crown. As his power increased, Charlemagne planned to restore the Western Empire. Having gone to Italy to assist the Pope, on Christmas Day 800 he was crowned and proclaimed Cæsar and Augustus by Leo III. He died 28th Jan., 814, in the forty-seventh year of his reign. Charlemagne was a friend of learning, and deserves the name of restorer of the sciences and teacher of his people. He attracted by his liberality the most distinguished scholars to his court (among others, Alcuin, from England), and established an academy in his palace at Aix-la-Chapelle. His empire comprehended France, most of Catalonia, Navarre, and Aragon, the Netherlands, Germany as far as the Elbe, Saale, and Eider, Upper and Middle Italy, Istria, and a part of Slavonia. He was succeeded by his son Louis (le Débonnaire).—BIBLIOGRAPHY: J. I. Mombert, *History of Charles the Great*; H. W. C. Davis, *Charlemagne* (in *Heroes of the Nations Series*).

Charleroi, a town in Belgium, province of Hainaut, on both sides of the River Sambre, 20 miles E.N.E. of Mons. It has manufactures of glass, hardware, and woollen stuffs, and in the neighbourhood are extensive pits of iron and coal (the ironworks of Corvillet). Pop. 26,886.

Charles I, or Carol (1839-1914), King

of Romania. He was the second son of Prince Karl Anton of Hohenzollern-Sigmaringen, and was elected Prince of Romania, at that time nominally part of the Turkish Empire, in April, 1866. A few weeks after the outbreak of the Turkish War (1877) Romania declared her independence, but this was accepted by the Powers only in 1881, when Prince Charles assumed the title of king. He married Princess Elizabeth von Wied, better known as Carmen Sylva.

Charles, the name of ten kings of France, whose dates are as follows:

the battle of Pavia in 1525, where Francis was totally defeated and taken prisoner. A league of Italian states, headed by Pope Clement VII, was now formed against the overgrown power of Charles; but their ill-directed efforts had no success. Rome itself was stormed and pillaged by the troops of the Constable of Bourbon, and the Pope made prisoner. Nor was the alliance of Henry VIII of England with Francis against the emperor any more successful, the war ending in a treaty (Cambrai, 1529) of which the conditions were favourable to Charles. A new war

	Born.	Began to Reign.	Died.	Son of.
Charles I (the Bald) ..	823	843	877	Louis the Pious
Charles II (the Fat) ..	832	882	888	Louis the German
Charles III (the Simple) ..	879	898	929	Louis the Stammerer
Charles IV (the Handsome)	1204	1322	1328	Philip IV
Charles V (the Wise) ..	1337	1364	1380	John II
Charles VI (the Silly) ..	1368	1380	1422	Charles V
Charles VII	1403	1422	1461	Charles VI
Charles VIII	1470	1483	1498	Louis XI
Charles IX	1550	1560	1574	Henry II
Charles X	1757	1824	1836	The Dauphin, eldest son of Louis XV
			(abdicated 1830)	

Charles IV (1316–1378), Emperor of Germany. He was the son of King John of Bohemia. In 1346 he was elected emperor by five of the electoral princes, while the actual emperor, Louis the Bavarian, was still alive. In 1354 he went to Italy and was crowned King of Italy at Milan, and emperor at Rome the year following. He encouraged trade, industry, and agriculture, made Prague a great city, and established there the first German university (1348).

Charles V (1500–1558), Emperor of Germany and King of Spain (in the latter capacity he is called Charles I), the eldest son of Philip, Archduke of Austria, and of Joanna, the daughter of Ferdinand and Isabella of Spain. On the death of Ferdinand, his grandfather, Charles assumed the title of King of Spain. In 1519 he was elected emperor, and was crowned at Aix-la-Chapelle with extraordinary splendour. He met Luther at the momentous Diet of Worms (1521). A war with France, which the rival claims of Francis I in Italy, the Netherlands, and Navarre made inevitable, broke out in 1521. Neither side had a decided success till

with France arose regarding the territory of Milan. The quarrel was patched up by the Peace of Crépy in 1545. The religious strife was ended by the Treaty of Passau, which was dictated by the Protestants. It gave them equal rights with the Catholics, and was confirmed three years later by the Diet of Augsburg (1555). Foiled in his schemes, Charles resolved to resign the imperial dignity and transfer his hereditary estates to his son Philip. In 1556 he retired to a residence beside the monastery of Yuste in Estremadura.—BIBLIOGRAPHY: W. Robertson, *History of the Emperor Charles V*; Sir W. Stirling-Maxwell, *The Cloister Life of the Emperor Charles V*.

Charles I (1600–1649), King of England, Scotland, and Ireland, was the third son of James I and VI and Anne of Denmark. On the 27th of March, 1625, he succeeded to the throne. The first Parliament which he summoned, being more disposed to state grievances than grant supplies, was dissolved. Next year (1626) a new Parliament was summoned, but was soon dissolved. In 1628 the king was obliged to call a new Parliament, which after voting

the supplies prepared the Petition of Right. Charles again dissolved the Parliament, resolving to try and reign without one. In this endeavour he was supported by Strafford and Laud as his chief counsellors. With their help Charles continued eleven years without summoning a Parliament. In 1637 John Hampden (q.v.) began the policy of resistance to the king's arbitrary measures by refusing to pay ship-money. It was in Scotland, however, that formal warlike opposition was destined to commence. In 1636 the new *Book of Canons* was issued by the king's authority, and this attempt of Charles to introduce an Anglican liturgy into Scotland produced violent tumults, and gave origin to the Covenant in 1638 to oppose the king's design. An English army was sent north, but was defeated by the army of the Covenanters, and in 1640 a Parliament was again summoned, which proved to be the famous Long Parliament. An account of the struggle between king and Parliament, the trial and execution of Strafford and Laud, &c., cannot here be given. The loss of the battle of Naseby (1645) completed the ruin of the king's cause. Charles at length gave himself up to the Scottish army at Newark (5th May, 1646). After some negotiations he was surrendered to the commissioners of the Parliament. The extreme sect of the Independents, largely represented in the army and headed by Cromwell, now got the upper hand, and brought Charles to trial for high treason against the people, and had sentence of death pronounced against him. He was beheaded before the Banqueting House, Whitehall, on 30th Jan., 1649.—BIBLIOGRAPHY: S. R. Gardiner, *History of England*; G. M. Trevelyan, *England under the Stuarts*; Sir J. Skelton, *Charles I.*

Charles II (1630–1685), King of England, Ireland, and Scotland, son of Charles I and Henrietta Maria of France. He was a refugee at The Hague at the time of the death of his father, on which he immediately assumed the royal title. He was crowned at Scone in 1651, and defeated by Cromwell at Worcester on 3rd Sept., escaping to France afterwards. On the death of Cromwell the Restoration, effected without a struggle by General Monk, set Charles on the throne. For a time his measures, mainly counselled by the Chancellor Lord Clarendon, were prudent and

conciliatory. But the indolence, extravagance, and licentious habits of the king soon involved the nation as well as himself in difficulties. Dunkirk was sold to the French, and war broke out with Holland. A Dutch fleet entered the Thames, and burned and destroyed ships as far up as Chatham. The great plague in 1665, and the great fire of London the year following, added to the disasters of the period. The extravagance of the king made him willing to become a mere pensioner of Louis XIV. In 1679 the Habeas Corpus Act was passed, and the temper of the Parliament was so much excited that the king dissolved it. A new Parliament which assembled in 1680 had to be dissolved for a like reason, and yet another which met the year following at Oxford. Finally Charles, like his father, determined to govern without a Parliament, and became as absolute as any sovereign in Europe. He died from the consequences of an apoplectic fit in Feb., 1685, after having received the sacrament according to the rites of the Roman Church.—BIBLIOGRAPHY: S. R. Gardiner, *History of the Commonwealth*; O. Airy, *Charles II*; E. Scott, *The King in Exile*.

Charles XII (1682–1718), King of Sweden, was born at Stockholm. As he was only fifteen when he came to the throne, Frederick IV of Denmark, Augustus II of Poland, and the Tsar Peter I of Russia concluded an alliance which resulted in war against Sweden. Charles stormed the Tsar's camp at Narva, slaying 30,000 Russians and dispersing the rest (30th Nov., 1700). He drove Augustus from Poland, had the crown of that country conferred on Stanislaus Leszczyński, and dictated the conditions of peace at Altranstadt, in Saxony, in 1706. Charles was utterly defeated by Tsar Peter I at Poltava, and fled to Bender, in the Turkish territory. Arrived in his own country in 1714, he set about the measures necessary to defend the kingdom, but was slain by a cannon-ball as he was besieging Frederikshall.—Cf. R. N. Bain, *Charles XII and the Collapse of the Swedish Empire*.

Charles XIII (1748–1818), King of Sweden. The Revolution of 1809 placed him on the throne at a very critical period, but his prudent conduct procured the union of Sweden with Norway, 4th Nov., 1814.

Charles XIV. See *Bernadotte*.
Charles I, King of Spain. See *Charles V, Emperor of Germany*.

Charles IV (1748-1819), King of Spain. He succeeded his brother, Ferdinand VI, in 1788, and abdicated in favour of Napoleon in 1808.

Charles, Archduke of Austria (1771-1847), third son of the Emperor Leopold II. In 1796 he was appointed commander-in-chief of the Austrian army on the Rhine, and won several victories against the French. In 1805 he commanded in Italy against Masséna, and won Caldiero (31st Oct.); but in the campaign of 1809 in Germany against Napoleon he was defeated at Wagram.

Charles Albert (1798-1849), King of Sardinia. In 1831 he succeeded to the throne on the death of Charles Felix. He took the field against Austria on behalf of the Lombardo-Venetian provinces, but was crushingly defeated at Novara, 23rd March, 1849. He abdicated in favour of his son, Victor Emmanuel, and retired to Portugal.

Charles Martel (c. 688-741), ruler of the Franks, a son of Pepin Héristal. Charles Martel rendered his rule famous by the great victory which he gained in Oct., 732, over the Saracens, near Tours, from which he acquired the name of *Martel*, signifying *hammer*. Charlemagne was his grandson.

Charles the Bold (1433-1477), Duke of Burgundy, son of Philip the Good and Isabella of Portugal. While his father yet lived Charles marched on Paris with 20,000 men, defeated Louis XI in 1466, and won the counties of Boulogne, Guines, and Ponthieu. He succeeded his father in 1467. Louis meanwhile involved him in greater embarrassments by exciting against him Austria and the Swiss. Charles lost ten months in a futile siege of Neuss, but was successful in conquering Lorraine from Duke René. Charles now turned his arms against the Swiss, took the city of Granson, putting 800 men to the sword. But this cruelty was speedily avenged by the descent of a Swiss army, which at the first shock routed the duke's forces at Granson, 1476. Charles was again defeated with great loss at Morat. The Swiss, led by the Duke of Lorraine, now undertook the reconquest of Lorraine, and obtained possession of Nancy. Charles marched to recover it, but was utterly routed and

himself slain.—**BIBLIOGRAPHY:** J. F. Kirk, *History of Charles the Bold*; R. Putnam, *Charles the Bold*.

Charles River, a river in Massachusetts, which flows into Boston harbour.

Charleston, a seaport of South Carolina, U.S.A., on a tongue of land formed by the confluence of the Rivers Cooper and Ashley, which unite just below the city and form a spacious and convenient harbour, with accommodation for vessels drawing 29 feet. It is much the largest town in the state, and is one of the leading commercial cities in the south. The staple exports are cotton, cotton-seed, rice, resin and turpentine, lumber, and phosphate. Pop. 67,957.

Charleston, capital city of West Virginia, U.S.A., is situated on the Kanawha River. Coal, petroleum, and salt are found near by, and the town is a great lumber centre. Pop. 39,608.

Charlestown, a former city and seaport of the U.S.A., since 1874 part of the municipality of Boston, with which it is connected by bridges across Charles River. In the south-east part there is one of the chief navy-yards in the United States.

Charleville, a town, France, department of Ardennes, on the Meuse, opposite Mézières, which is joined to it by a bridge. It has manufactures of metal goods, and a trade in coal, iron, wine, &c. Pop. 21,689.

Charlock, the English name of *Sinapis arvensis*, a common yellow weed in cornfields, also called wild mustard. Jointed or white charlock is *Raphanus Raphanistrum*. It too is a common cornfield weed, but it has white or straw-coloured flowers and jointed pods. See illustration on next page.

Charlotte, a town of the U.S.A., in North Carolina, with several manufacturing establishments. Outside the city limits is Biddle University for coloured students. Pop. 46,338.

Charlotte Amalie. See *St. Thomas*.

Charlottenburg, a town of Prussia, on the Spree, about 3 miles from Berlin, with a great technical school, also a number of industrial and manufacturing establishments. It is now incorporated with Berlin.

Charlottetown, a town of British North America, capital of Prince Edward Island. It is advantageously situated for commerce, and its harbour is one of the best in North America. The low-water depth

at the main wharf is 24 feet. Pop. 12,347.

Charon, in Greek mythology, the son of Erebus and Night. It was his office to ferry the dead over the rivers of the infernal regions, for which he received an obolus.

Charpentier, Gustave (1860–), French musical composer. The most famous of his works, for which he wrote both music and libretto, is his opera *Louise*, produced at the Opéra Comique, Paris, in 1900. His other works include: *La Vie du Poète*, *Julien*, *Marie*, and *Orphée*.

Chart, a term applied chiefly to a representation of some portion of the sea, with or without adjacent coasts. A hydrographical or marine chart displays such coasts, islands, rocks, channels, harbours, rivers, and bays as occur in the section covered; with points of the compass, soundings—that is, depth of water, &c.: every guidance needed by a vessel for her safety in the neighbourhood. In a *plane*

tude and longitude everywhere equal to each other. The Hydrographic Department of the British Admiralty produces or has produced charts which cover almost every known sea, and which are renowned for accuracy and completeness. Charts of certain much-frequented trade routes are issued monthly, and give valuable information as to wind, weather, and temperatures to be expected. See also *Map*.

Chartered Companies, trading companies which receive from the Government of the country to which they belong a charter granting them certain rights and privileges in a certain region or sphere of action, and also imposing upon them certain obligations or restrictions. One of the oldest, and the greatest and most celebrated of all these companies, was the East India Company. The Hudson Bay Company, though later in origin, still exists in a highly flourishing condition. The Imperial British East Africa Company had a comparatively short career—from 1888 to 1897. Its founder was Sir W. Mackinnon (died in 1893), and it was mainly through him and the company that Uganda and the region extending between it and the Indian Ocean were secured to the British Empire. The National African Company received a charter in 1886, and became well known as the Royal Niger Company. The company became simply a trading company—the Niger Company, Limited—in 1900. In South Africa a huge tract of territory, the main portion of which is now comprised in Rhodesia, has been acquired for Britain by the British South Africa Company. The moving spirit in this company was the late Cecil Rhodes, and the charter was obtained in 1889. It expired in 1914, but was renewed for a further period of ten years. In 1923 responsible government was established in Rhodesia; the company received compensation of £3,750,000. It still, however, retains extensive interests in Rhodesia. (See *Rhodesia*.) Another chartered company is the British North Borneo Company, which acquired its charter in 1882.

Charterhouse, a school and charitable foundation in the city of London. It was originally a priory for Carthusian monks (hence the name, a corruption of *Chartreuse*). After the dissolution of the monasteries it came into the possession of Thomas Sutton, who converted it into a hospital



Charlock or Wild Mustard (*Sinapis arvensis*)

1, Flower (petals removed). 2, Petal. 3, Fruit.

chart the meridians are supposed parallel to each other, the parallels of latitude at equal distances, and the degrees of lati-

and school, richly endowed, consisting of a master, preacher, head schoolmaster, forty-four boys and eighty decayed gentlemen, with a physician and other officers and servants. In 1872 the Charterhouse School was removed to new buildings at Godalming, in Surrey. The old premises were sold to the Merchant Taylors' School, which is now installed here in new buildings erected in 1875. The non-academic department of the Charterhouse still remains in the old hospital buildings.

Charter-party, a contract executed by the freighter and the master or owner of a ship, containing the terms upon which the ship is hired to freight. The ordinary forms of charter are either for the use of a ship on a particular voyage to carry particular goods to be shipped by the charterer, or a similar charter with liberty given to the charterer to carry goods of any shippers as in a general ship, or a charter of a ship for a particular time. The masters and owners usually bind themselves that the goods shall be delivered (dangers of the sea excepted) in good condition. The charterer is bound to furnish the cargo at the place of lading, and to take delivery at the port of discharge within specified periods called *lay days*.—Cf. Sir T. E. Scrutton, *Charter-parties and Bills of Lading*.

Charters Towers, a town of Australia, in Queensland, on the northern spurs of the Towers Mountains, a flourishing place, with rich gold-mines. Pop. 9499.

Chartier, Alain (c. 1392–c. 1430), French poet and political writer. His chief poetical piece is the *Livre des Quatre Dames*, and his principal prose work the *Quadrilogue Invectif*, a dialogue between France and the three orders of the State.

Chartism and Chartists, names for a political movement in Britain and its supporters. It was founded on the general idea that the evils under which the people were labouring were due to the misconduct of the Government and a defective political representation. In 1838 the famous 'Charter', or 'People's Charter', was drawn up. It comprised six heads, namely: (1) Manhood suffrage. (2) Equal electoral districts. (3) Vote by ballot. (4) Annual Parliaments. (5) No other qualifications to be necessary for members of Parliament than the choice of the electors. (6) Members of Parliament to be paid for their services. In June, 1839, after the refusal of the

House of Commons to consider a monster petition in favour of the Charter, serious riots took place. In 1848 a great demonstration on the part of the Chartists was organized. But the preparations taken by the Government for defence prevented outbreaks of any consequence, and Chartism then gradually declined.—**BIBLIOGRAPHY:** Carlyle, *Chartism*; R. G. Gamage, *History of the Chartist Movement*.

Chartres, a city, France, capital of the department of Eure-et-Loire, on the Eure. It is a very ancient city, and has a magnificent cathedral. It has manufactures of woollens, hats, machinery, leather, &c. Pop. 24,103.

Chartreuse, a monastery in South-Eastern France, north-east of Grenoble, at the foot of high mountains, 3280 feet above sea-level. It was founded in 1084.

Charybdis, an eddy or whirlpool in the Straits of Messina, regarded as the more dangerous to sailors because in endeavouring to escape it they ran the risk of being wrecked upon Scylla, a rock opposite to it.

Chastelard, or **Châteland**, Pierre de Bocosel de (1540–1563), French poet. He fell madly in love with Mary Stewart, followed her to Scotland, and was foolish enough to invade twice the royal bed-chamber. He was tried publicly at St. Andrews and hanged.

Chat, the popular name of birds of the genus *Saxicola*, family *Sylviidae* or warblers, three species of which—stone-chat, whin-chat, and wheat-ear—are found in Britain. They are small birds, and can be easily recognized by their quick, darting movements.

Chateaubriand, François Auguste, Vicomte de (1768–1848), French author and politician. After serving in the navy and the army he travelled in North America; he returned to France after the flight of Louis XVI; was wounded at the siege of Thionville and, suffering many miseries, made his way to London. Here he published in 1797 his *Essai Historique*. In 1800 he returned to France, and in the following year published his romance of *Atala*, and the year after his celebrated work *Le Génie du Christianisme*, which is a kind of brilliant picture of Christianity in an æsthetic and romantic aspect. After a short career as diplomatist under Napoleon, Chateaubriand made a tour in the East (1806). As the fruit of his travels

he published *Les Martyrs* (1809) and *Itinéraire de Paris à Jérusalem* (1811). He hailed the restoration of Louis XVIII with enthusiasm, was appointed Ambassador to Berlin, and then to London, but in 1824 was dismissed. After the Revolution of 1830 he refused to take the oath of allegiance to Louis Philippe. His memoirs (*Mémoires d'outre-tombe*) contain severe judgments on contemporary men and things.

Châteauroux, a town, France, capital of the department of Indre. Cloth, cotton, hosiery, woollen yarn, paper, &c., are made; and there are tanneries and dye-works. Pop. 26,500.

Château-Thierry, a town, France, department of Aisne, on the Marne, with manufactures of linen and cotton twist, pottery, leather, &c. Pop. 7770.

Châtelet, a manufacturing town of Belgium, province of Hainaut, on the Sambre. Pop. 11,573.

Châtelineau, a manufacturing town of Belgium, province of Hainaut, on the Sambre, opposite Châtelet. Pop. 14,500.

Châtellerault, a town, France, department of Vienne, 20 miles N.N.E. of Poitiers, on the Vienne. It gives a title to the Duke of Hamilton. It has a Government small-arms factory, and manufactures cutlery, hardware, &c. Pop. 17,600.

Chatham, William Pitt, Earl of (1708–1778), British statesman. He was educated at Eton and Oxford, and entered Parliament as member for the borough of Old Sarum. In 1756 he became Secretary of State and real head of the Government. Dismissed in 1757, he returned to power the same year in conjunction with the Duke of Newcastle. It was under this administration and entirely under the inspiration of Pitt that Wolfe and Clive won Canada and India from the French. Pitt, disagreeing with Bute, resigned in 1761. In 1766 he undertook to form an administration, he himself going to the House of Lords as Earl of Chatham. But the ministry was not a success, and in 1768 he resigned. After this his principal work was his appeals for a conciliatory policy towards the colonies. — **BIBLIOGRAPHY:** Rev. F. Thackeray, *History of the Right Hon. William Pitt, Earl of Chatham*; F. Harrison, *Chatham* (in *Twelve English Statesmen*); Lord Rosebery, *Lord Chatham: his Early Life and Connections*.

Chatham, a municipal borough, naval

arsenal, and seaport, England, county Kent, on the Medway, almost forming one town with Rochester. The importance of Chatham is due to the naval and military establishments at Brompton in its immediate vicinity. The royal dockyard was founded by Queen Elizabeth. Since 1867 it has been greatly enlarged, and is now about 2 miles in length, with most capacious docks, in which the heaviest warships can be equipped and sent directly to sea. Building-slips, saw-mills, and metal-mills, and all the requisites of a great naval station are here on the largest scale and in the finest order. The military establishments include extensive barracks, arsenal, and park of artillery, hospital, store-houses and magazines, &c. The town is defended by a strong line of fortifications. Pop. (1931), 42,996.

Chatham, a town of Canada, province of Ontario, on the River Thames, 11 miles north of Lake Erie, with manufactures of machinery, iron castings, and woollens, and a trade in lumber, &c. Pop. 13,256.

Chatham Islands, a group of three islands in the South Pacific Ocean, belonging to New Zealand; total area, 372 sq. miles. The largest, or Chatham Island, is about 38 miles long and 350 sq. miles in area. Pitt Island is much smaller, and Rangatira is an insignificant patch. A considerable portion of Chatham Island is occupied by a salt lagoon. The soil is in many places fertile, and crops of potatoes, wheat, and vegetables are successfully grown. Cattle and sheep are reared, and thus whaling or other vessels which call are supplied with fresh provisions as well as with water. The seas around the Chatham Islands are extremely dangerous. The present population amounts to 268 (1926). The islands form part of New Zealand for administrative purposes.

Chattahoochee, a river, U.S.A., rising in the Appalachian Mountains, and forming for a considerable distance the boundary between Georgia and Alabama. In its lower course, after the junction of the Flint River, it is named the Appalachicola.

Chattanooga, a town of the U.S.A., in Tennessee, on the Tennessee River. There are manufactures of cotton, leather, and iron goods, and a large trade. Pop. 57,895.

Chattels, property movable and immovable, not being freehold. Chattels are

divided into real and personal. Chattels *real* are such as belong not to the person immediately, but dependently upon something, as an interest in a land or tenement, or a lease, or an interest in advowsons. Any interest in land or tenements, for example, is a real chattel; so also is a lease, an interest in advowsons, and so forth. Chattels *personal* are goods which belong immediately to the person of the owner, and include all movable property.

Chatterton, Thomas (1752-1770), English poet. He was born at Bristol of poor parents, and educated at a charity school. He exhibited great precocity, became extremely devoted to reading, and was especially fond of old writings and documents. In 1768, when the new bridge at Bristol was completed, he inserted a paper in the *Bristol Journal* entitled *A Description of the Friars' First Passing over the Old Bridge*, which he pretended he had found along with other old manuscripts in an old chest in St. Mary Redcliffe Church, Bristol. He also showed his friends several poems of similarly spurious antiquity which he attributed to one Rowley. In 1770 he went to London, where a favourable reception from the booksellers gave him high hopes. For them he wrote numerous pamphlets, satires, and letters, but got no substantial return. At last, after having been several days without food, he poisoned himself. The most remarkable of his poems are those published under the name of Rowley (*The Rowley Poems*), spurious antiques, such as *The Tragedy of Ælla*, *The Battle of Hastings*, *The Bristow Tragedy*, &c.—BIBLIOGRAPHY: D. Wilson, *Chatterton: a Biographical Study*; J. H. Ingram, *The True Chatterton*.

Chaucer, Geoffrey (c. 1340-1400), English poet. His father was a well-to-do vintner of London. Chaucer became page to Lionel, Duke of Clarence, and his wife, the Countess of Ulster, in 1357. In 1359 he went to France as a soldier; he was taken prisoner, but was liberated in March, 1360. In 1369 Chaucer was again campaigning in France; he is spoken of as "a squire of less estate". During the next ten years Chaucer was often abroad on diplomatic missions. In 1370 he went abroad, though we do not know his destination; in 1373 he went with two others to Genoa to settle a commercial treaty. In 1374 he was appointed Comp-

troller of the Customs of Wool in the Port of London. In 1376 Chaucer was employed on some secret mission with Sir J. Burley; the next year he went to Flanders, and later on in the year to France, where he was engaged in peace negotiations. In 1378 he was again in France, endeavouring to arrange a marriage between Richard II and a daughter of the King of France. In the same year he went to Lombardy on a mission to the Duke of Milan. In 1382 Chaucer was appointed to be Comptroller of Petty Customs in the Port of London, and was given permission to discharge his duties by deputy. In 1385 he was given similar permission with regard to his duties as Comptroller of Wool. In 1386 Chaucer was elected a Knight of the Shire for Kent. Later in this year he was deprived of both his comptrollerships. In 1389 he was appointed Clerk of the King's Works by Richard II, and in the following year he was made Forester of North Petherton Park, in Somerset. After some years of poverty the accession of Henry IV in 1399 brought prosperity again to the poet, who was now old and in failing health. He was given forty marks a year, as well as his pension of £20. On the strength of this prosperity he leased a house in Westminster for fifty-three years. He was not to enjoy his good fortune long, for he died on 25th Oct., 1400, and was buried in Westminster Abbey.

Chaucer's work has for long been divided into three periods—the French, the Italian, and the English.

The First, or French Period may be said to date from when Chaucer began to write until about the year 1379. Most of his early works are translations from the French. The most important of these is the translation of *The Romaunt of the Rose*, a very famous French poem begun by William de Lorris as a romance and finished by Jean de Meung as a satire. It is usually thought that the translation of *The Romaunt of the Rose* which we possess is not in its entirety the work of Chaucer. It is not only good in itself, but is admirably faithful to the original. In 1369, Blanche, the first wife of John of Gaunt, died, and Chaucer wrote *The Book of the Duchesse* in memory of her. In 1373, when Chaucer perhaps met Petrarch at Padua, he probably wrote *The Story of Grisilde*, afterwards intro-

duced into the *Canterbury Tales* as *The Clerk's Tale*. In this first or more or less French period we may place the following, though the exact dates of them are not known: *Chaucer's A.B.C.*, a prayer to the Virgin; *The Life of Saint Cecyle*, afterwards *The Second Nun's Tale*; *The Complaynte unto Pite*, a piece of no great merit; *The Story of Constance*, afterwards *The Man of Law's Tale*; *The Twelve Tragedies*, afterwards *The Monk's Tale*; and *The Complaynte of Mars*.

The Second, or Italian Period.—*The Parlement of Foules* was written in 1382 for the marriage of Richard II and Anne of Bohemia. It is a delightful poem, but, although it seems altogether English and original, it is, as a matter of fact, based upon Italian and French models. *The Hous of Fame*, an incomplete poem with many reminiscences of Dante, was probably written in 1384. *The Legende of Good Women* was written in about 1385. The Prologue of this poem is an excellent piece of work, and the poem itself is good, but the scheme which lay behind it did not admit of any variety. There were to have been twenty stories, but only eight were completed. *The Complaynte to his Lady, Anelida and Arcyte*, *To Adam the Scryeayne*, and the delightful mock-sentimental ballad *To Rosamonde* are all minor poems written about this time. To this period also belongs Chaucer's *Translation of Boethius*, whom he translated into prose. But by far the most important poem of this period is *Troilus and Criseyde* a poem based upon the *Filostrato* of Boccaccio. This is considered by some critics to be Chaucer's masterpiece, though it does not make such a universal appeal as the *Canterbury Tales*. *Palamon and Arcite*, afterwards *The Knight's Tale*, is also modelled on Boccaccio (*The Teseide*), and was also written about this time.

The Third, or English Period contains several minor poems, the *Envoy to Scogan*, the *Envoy to Bukton*, the *Complaynte to his Purse* (1399), *The Former Age*, *Fortune*, *Truth*, *Gentillesse*, and *Lak of Stedfastnesse*. In 1391 he wrote a *Treatise on the Astrolabe*, dedicated to his little son Lewis, a boy at that time ten years old. But by far the greatest of all Chaucer's works, as well as the most typical of his final or English period, is the immortal *Canterbury Tales*. It has been suggested that Chaucer derived from Boccaccio the idea

of a connected series of tales. This may or may not have been so; the plan of collecting different tales and linking them up by means of a central story was of great antiquity in the East. But if Chaucer owed any debt to Boccaccio, he has repaid it with interest, for the framework of the *Canterbury Tales* is far more artistic than that of the *Decameron*. A pilgrimage, upon which all sorts and conditions of men met on terms of temporary equality, and combined religion with holiday-making, was an ideal setting for a varied collection of tales. The original scheme of the tales was too much even for Chaucer to carry out; had it been adhered to we might have had some one hundred and twenty tales, as it is we have only twenty-four. Even in their incomplete condition the tales not only give us by far the best picture which we possess of life in the Middle Ages, they are also one of the greatest works in English, or for that matter in any language.—BIBLIOGRAPHY: T. R. Lounsbury, *Studies in Chaucer*; A. W. Pollard, *Chaucer*; Sir A. W. Ward, *Chaucer* (English Men of Letters Series).

Chaudière, a river of Canada, Quebec province, which rises on the borders of Maine, and flows into the St. Lawrence about 6 miles above Quebec. The banks of the river are generally steep and rocky, and about 3 miles above its junction with the St. Lawrence are the Chaudière Falls, about 120 feet high.

Chaumont, a town, France, capital of the department of Haute-Marne, on a height between the Marne and the Suize. It has a trade in corn and iron. Pop. 14,870.

Chauny, a town, France, department of Aisne, on the Oise. It has manufactures of sacking, soda, sulphuric and nitric acids; cotton-mills, bleachworks, and tanneries. Pop. 10,640.

Chautauqua, a beautiful lake in New York State, U.S.A., 18 miles long and 1 to 3 miles broad. On its banks is the village of Chautauqua. The Chautauqua Literary and Scientific Circle has taken origin here, the most prominent feature of which is to engage the members—wherever they may reside—in a regular and systematic course of reading, extending, when completed, over four years, and entitling the student to a diploma.

Chauvinism, an unreflecting and fanatical devotion to any cause, so called from

Nicholas Chauvin, a soldier so enthusiastically devoted to Napoleon I and so demonstrative in his adoration that his comrades turned him into ridicule. Chauvin was the principal character in several French plays, e.g. Scribe's *Soldat Laboureur*.

Chaux-de-Fonds, La, a town of Switzerland, in the canton of Neuchâtel, in a deep valley of the Jura. The inhabitants are largely engaged in the making of watches and clocks, and in similar branches of industry. Pop. 37,708.

Cheadle, a market town of England, in the north of Staffordshire, with collieries and manufactures of hardware. Pop. 6000. There is another Cheadle in Cheshire, 2½ miles south-west of Stockport, forming along with Gatley an urban district. Pop. (urban district) (1931), 18,469.

Cheb (formerly Eger), a town of Bohemia, Czechoslovakia, 91 miles west of Prague. It has manufactures of woollens, cottons, leather, and soap. It was at one time an important fortress, but it has now been dismantled. Pop. 27,524.

Chechensk, an autonomous region of Russia formed from the Chechensk province of the Gorski Republic (q.v.).

Cheddar, a thriving village, England, county Somerset, 18 miles south-west of Bristol, with dairies which have long been famous for their cheese.

Cheduba, a district of Burma; area, 240 sq. miles; pop. 30,197. It includes the Island of Cheduba in the Bay of Bengal. The soil is fertile, and produces tobacco, rice, indigo, and pepper. Petroleum is also found.

Cheese, one of the most important products of the dairy, is composed principally of *casein*—which exists in cows' milk to the extent of about 3 or 4 per cent—fat, and water. It is made from milk, skimmed wholly, partially, or not at all, the milk being curdled or coagulated, and the watery portion or whey separated from the insoluble curd, which being then worked into a uniform mass, salted (as a rule), and pressed in a vat or mould forms cheese, but requires to be *cured* or *ripened* for a time before being used. The coagulation of the milk may be effected either by adding an acid, as in Holland, or sour milk, as in Switzerland, or rennet, as usual in Britain and America. There are a great many varieties of cheese, of which the most notable are Stilton,

Cheshire, Cheddar, Wiltshire 'truckles', Dunlop, amongst British; and Parmesan, Gruyère (Emmenthaler), Gorgonzola, Gouda, Roquefort, Camembert, amongst foreign ones. In the United States cheese manufacture is carried on on a huge scale, and almost all the different European kinds, but chiefly Cheddar, are made. Large factories are there devoted to the manufacture, receiving the milk of many hundred cows. Cheese to the value of over £20,000,000 is imported by Britain every year, some three-fourths from Canada, much also coming from the United States, Holland, and New Zealand. Sheep's- and goat's-milk cheeses are also made.

Cheese-fly, a small black fly (*Piophilæ casei*) akin to the house-fly or blow-fly. It lays its eggs in the cracks of cheese. The maggot, well known as the *cheese-hopper*, can project itself twenty to thirty times its own length.

Cheetah, the *Cynelurus jubatus* or hunting leopard of India, a native of Arabia and Asia Minor. It is about the size of a large greyhound, has a cat-like head, but a body more like a dog's. A slightly different variety inhabits Africa.

Chefoo, a treaty port of China, province of Shantung. It has a fine climate, and the district is very fertile. The chief exports are silk, straw braid, vermicelli, and fruit. A new breakwater makes discharge of cargo into lighters possible in all weathers. Pop. 83,300.

Cheke, Sir John (1514-1557), English scholar. He was educated at St. John's College, Cambridge, and made the first regius professor of Greek. In 1544 he was appointed tutor to the future Edward VI. His chief distinction was the impulse given by him to the study of Greek. He wrote *De Pronuntiatione Græcæ Linguae*.

Chekhov, Anton Pavlovitch (1860-1904), Russian novelist and dramatist. His works include: *Philosophy at Home*, *Sorrow*, *In Exile*, *Darling*, *Terrible Night*, *The Black Moon* and *other Stories*, and *The Kiss and other Stories*. Among his plays are: *The Sea-Gull*, *The Cherry Garden*, *The Swan Song*, and *Uncle Vanya*. Chekhov is a great stylist, his mastery of words being wonderful. In depicting his characters he is strictly objective and realistic, although he is not free from a strain of pessimism.

Chekiang, a maritime province, China, including the Chusan Archipelago; area,

36,670 sq. miles; pop. 13,950,000. It is traversed by the Grand Canal, and its principal ports are Ningpo and Hangchow, the capital. Staple exports are silk and tea.

Chellean. See *Palaeolithic Age*.

Chelmsford, Lord, Frederic Augustus Thesiger (1827–1905), British soldier, eldest son of the first Lord Chelmsford, who was twice Lord Chancellor. In 1877 he was appointed commander of the forces and Lieutenant-Governor of Cape Colony. He restored Kaffraria to tranquillity, and was given the chief command in the Zulu War of 1879. After great difficulties with the transport, and some disasters, he gained the decisive victory of Ulundi.

Chelmsford, Frederic John Napier Thesiger, first Viscount (1868–1933), British administrator. He was Governor of Queensland from 1905 to 1909, and Governor of New South Wales from 1909 to 1913. He was appointed Viceroy of India in 1916, and held this office until 1921, when he was succeeded by the Marquess of Reading. He was First Lord of the Admiralty from Jan. to Oct., 1924.

Chelmsford, county town of Essex, England. There are manufactories of agricultural implements, and a trade in corn and malt. Pop. (1931), 26,537.

Chelsea, a metropolitan borough of London, on the Thames, opposite Battersea, noted for its royal military hospital. Connected with the hospital is a royal military asylum, founded in 1801, for the education and maintenance of soldiers' children. Pop. (metropolitan borough), (1931), 59,026.

Chelsea, a city of Massachusetts, U.S.A., forming practically a north-east suburb of Boston. Pop. 43,184.

Cheltenham, a fashionable watering-place in England, in the county of Gloucester. It grew rapidly after the discovery of its saline, sulphuric, and chalybeate springs in 1716. The Cheltenham College for boys, founded in 1841, and the Ladies' College, founded in 1854, are both of high repute, and there is also a grammar-school (founded in 1574), and a training college for teachers. The town has little trade, and depends almost wholly on its visitors and resident families. Pop. (municipal borough), (1931), 49,385.

Chelyabinsk, a town, Russia, government of Orenburg, an important railway centre. The Trans-Ural lines from Perm

and Ufa here join the Siberian line to Irkutsk. There are grain-mills, and the trade in grain, agricultural implements, and textiles is large. Pop. (1926), 59,203.

Chelyuskin, Cape, the most northerly point of Siberia, a projection of the Taimyr Peninsula, called also *North-East Cape*.

Chemistry, the science which treats of the nature, laws of combination, and mutual actions of the minute particles of the different sorts of matter composing our universe, and the properties of the compounds they form. It is a modern science developed from the earlier *Alchemy* (q.v.). For a time Stahl's 'phlogistic theory' (see *Phlogiston*) dominated speculation in chemistry, but about the middle of the eighteenth century Dr. Black (q.v.) made his great discovery of a gas differing from atmospheric air, rapidly followed by that of a number of other gases by Cavendish, Rutherford, Priestley, and Scheele. The discovery of oxygen by the two last-named chemists afforded to Lavoisier the means of revolutionizing and systematizing the science. By a series of experiments he showed that all substances, when burned, absorb oxygen, and that the weight of the products of combustion is exactly equal to that of the combustible consumed and of the oxygen which has disappeared. The application of this theory to the great majority of the most important chemical phenomena was obvious, and the Stahlian hypothesis disappeared. A yet more important step was the discovery by Dalton of the laws of chemical combination. His theory was immediately taken up by Berzelius, to whose influence, and careful determination of the chemical equivalents of almost all the elements then known, its rapid adoption was mainly due. To Berzelius we owe many of the modern improvements in the methods of analysis, while Sir H. Davy laid the foundation of electro-chemistry. The investigations of chemists have shown that the great majority of the different natural substances can be broken up into substances of less complicated nature, which resist all further attempts to decompose them, and appear to consist of only one kind of matter. These substances, by union of which all the different sorts of known matter are built up, are about eighty-five in number, and are called the *chemical elements*.

Laws of Combination.—(1) When substances, elementary or compound, combine together, they do so in fixed and definite proportions by weight. (*Law of definite proportions.*) (2) When substances combine in more than one proportion, the weights of the one substance which combine with a fixed weight of the other are multiples of a common factor. (*Law of multiple proportions.*) Thus, 28 parts of nitrogen combine with 16 parts of oxygen to form nitrous oxide, while 28 parts of the former and 32 of the oxygen produce nitric oxide. (3) Gases combine in fixed and definite proportions by volume as well as by weight, and the volume relationships can be expressed by simple integral numbers. (*Gay-Lussac's Law.*) Thus one volume of hydrogen combines with one of chlorine to yield two of hydrochloric acid gas; two of hydrogen with one of oxygen to yield two of steam (water vapour); and three of hydrogen with one of nitrogen, in the presence of acid, to yield two of ammonia.

Dalton, in 1804, introduced his atomic theory. According to this each element consists of a number of minute particles termed *atoms*. The atoms of any one element, e.g. hydrogen, are all alike as regards weight, size, &c., but differ from those of another element, say oxygen. For many years it was thought that these atoms were indivisible, and that they were the minutest particles of matter conceivable. The recent work of Sir J. J. Thomson and others has shown that in reality these atoms are themselves complex, and are built up of positive and negative *electrons* in such a manner that the atom as a whole is electrically neutral. According to this conception the atoms of all elements are formed of the same material—these electrons—but in different quantities, and it is thus not inconceivable that one element should be transformed into another. Quite recently, in fact, a German chemist has announced the transformation of small quantities of mercury into gold (see *Matter*).

The atoms are extremely minute, and it is impossible to determine the weight of the atom of any one element in ordinary units, e.g. in grammes, by purely chemical means, but chemists are able to determine the *relative* weights of the atoms. Thus the atom of lead is 207 times as heavy as the hydrogen atom. For various

reasons it has been concluded that the atoms of most elements do not exist singly but combine together in groups of two, three, &c., to form more complex particles, which are termed *molecules*. Thus the molecules of hydrogen, oxygen, nitrogen, chlorine, &c., each contain 2 atoms, ozone 3, phosphorus and arsenic 4, sulphur 8, and the majority of metals only 1, i.e. they are monatomic elements. When elements combine together, the combination occurs between the atoms, thus one atom of hydrogen combines with one atom of chlorine to yield a molecule of hydrochloric acid gas. Two atoms of hydrogen combine with one of oxygen to form a molecule of water or steam. An atom is sometimes defined as the smallest particle of an element which can enter into a chemical reaction, and the molecule as the smallest particle of a substance which can exhibit the characteristic properties of the substance. Gay-Lussac's law of volumes has been accounted for by a conclusion drawn by Avogadro (1811), that equal volumes of all gases under the same conditions of temperature and pressure contain the same number of molecules.

Symbols and Formulæ.—For the sake of convenience each element is represented by a symbol. The modern system consists in using the initial, or, in certain cases, to avoid confusion, the first two letters, of the English or Latin name, e.g. Al for aluminium, O for oxygen, C for carbon, Fe (from *ferrum*) for iron, Ag (*argentum*) for silver, &c. These symbols not merely stand for the different elements but for definite quantities, viz. for one atom, and since each atom has a definite relative weight each symbol represents a definite weight. In deciding the atomic weights it is necessary to select some atom as unity. For many purposes it is simplest to select the lightest atom, viz. hydrogen, as unit, and to compare all the others with this; in modern chemistry it is becoming more customary to select oxygen as the standard, to say O = 16 and to give all the others on this basis (since the majority of atomic weights are determined experimentally with reference to oxygen and not to hydrogen), then H = 1.008. The following is a list of the commoner elements with their symbols and atomic weights on the O = 16 standard (see also *Radio-activity*):

ELEMENTS AND ATOMIC WEIGHTS, O = 16

Aluminium.....Al	26.96	Hydrogen.....H	1.008	Rubidium.....Rb	85.45
Antimony.....Sb	121.77	Indium.....In	114.8	Ruthenium.....Ru	101.7
Argon.....A	39.9	Iodine.....I	126.92	Samarium.....Sm	150.4
Arsenic.....As	74.96	Iridium.....Ir	193.1	Scandium.....Sc	45.1
Barium.....Ba	137.37	Iron.....Fe	55.84	Selenium.....Se	79.2
Beryllium.....Be	9.1	Krypton.....Kr	82.92	Silicon.....Si	28.3
Bismuth.....Bi	209.0	Lanthanum.....La	139.0	Silver.....Ag	107.88
Boron.....B	10.9	Lead.....Pb	207.20	Sodium.....Na	23.00
Bromine.....Br	79.92	Lithium.....Li	6.94	Strontium.....Sr	87.63
Cadmium.....Cd	112.4	Magnesium.....Mg	24.32	Sulphur.....S	32.06
Cæsium.....Cs	132.81	Manganese.....Mn	54.93	Tantalum.....Ta	181.5
Calcium.....Ca	40.07	Mercury.....Hg	200.6	Tellurium.....Te	127.5
Carbon.....C	12.0	Molybdenum.....Mo	96.0	Terbium.....Tb	159.2
Cerium.....Ce	140.25	Neodymium.....Nd	144.3	Thallium.....Tl	204.0
Chlorine.....Cl	35.46	Neon.....Ne	20.2	Thorium.....Th	232.15
Chromium.....Cr	52.0	Nickel.....Ni	58.68	Thulium.....Tm	168.5
Cobalt.....Co	58.97	Nitrogen.....N	14.008	Tin.....Sn	118.7
Columbium.....Cb	93.1	Osmium.....Os	190.9	Titanium.....Ti	48.1
Copper.....Cu	63.57	Oxygen.....O	16	Tungsten.....W	184
Erbium.....Er	167.7	Palladium.....Pd	106.7	Uranium.....U	238.2
Fluorine.....F	19	Phosphorus.....P	31.04	Vanadium.....V	51.0
Gadolinium.....Gd	157.3	Platinum.....Pt	195.2	Xenon.....Xe	130.2
Gallium.....Ga	70.1	Potassium.....K	39.10	Ytterbium.....Yb	173.5
Germanium.....Ge	72.5	Radium.....Ra	226.0	Yttrium.....Y	89.33
Gold.....Au	197.2	Radon.....Rn	222.0	Zinc.....Zn	65.37
Helium.....He	4	Rhodium.....Rh	102.9	Zirconium.....Zr	90.6

Note.—Glucinum is another name for Beryllium, and Niobium for Columbium.

By means of these symbols we can use formulæ for different compounds, thus H_2O indicates a compound of the two elements hydrogen and oxygen, in which 2 parts by weight of the former are combined with 16 of the latter. This is the actual composition of water, and thus the formula for the compound water is H_2O . This formula further denotes one molecule of water, which is built up of two atoms of hydrogen and one of oxygen. Again, sulphuric acid is composed of H , O , and S , and the relative weights are 2 of H , 32 of S , and 64 of O ; we can therefore represent it by the formula H_2SO_4 (since $1H = 1$, $1S = 32$, and $1O = 16$). Similarly, the formula for marble or calcium carbonate is $CaCO_3$, and indicates one molecule built up of one atom of calcium, one of carbon, and three of oxygen, or 40 parts by weight of calcium, 12 of carbon, and 48 of oxygen. Slaked lime or calcium hydroxide is $Ca(OH)_2$, oxalic acid $H_2C_2O_4$. If we wish to denote more than one molecule of a compound we prefix a number, e.g. $2HCl$ indicates two molecules of hydrochloric acid gas, each consisting of one atom of hydrogen and one of chlorine.

Valency.—A glance at the formula of some simple hydrogen compounds, e.g. hydrogen chloride HCl , water H_2O , ammonia NH_3 , and methane CH_4 , or of certain metallic chlorides, e.g. $NaCl$, $CaCl_2$, $AlCl_3$, $SnCl_4$, indicates that the atoms of all the

elements will not combine with the same number of atoms of hydrogen or of chlorine. Thus it has become customary to divide the elements into groups according to their *valency*, or according to the number of atoms of hydrogen with which one atom of the given element can combine or which it can displace.

Monovalent Elements	H, Cl, Br, I, Na, K, Ag.
Divalent Elements	O, S, Ca, Ba, Sr, Pb, Sn.
Trivalent Elements	N, P, As, Sb, Al, B, Au.
Tetravalent Elements	C, Si, Sn, Pb.
Pentavalent Elements	N, P, As, Sb.
Hexavalent Elements	O, S, Se, Cr.

The above list indicates that the valency exhibited by any given element is not always the same, e.g. in phosphorus trichloride, PCl_3 , the phosphorus atom is trivalent, and in phosphorus pentachloride, PCl_5 , it is pentavalent.

Closely related to the atomic weight of an element is its *equivalent weight*; this is often defined as the weight of the element which can combine with or displace unit weight of hydrogen (or on the oxygen basis 8 parts by weight of oxygen). There is always a simple relationship between the equivalent and atomic weights. The atomic weight is either equal to or a simple multiple of the equivalent weight—or atomic weight = equivalent weight \times valency.

Classification of Chemical Substances.—

The elements themselves are usually divided into the two main groups, *Metals* and *Non-metals*. The metals, e.g. Fe, Cu, Ag, Zn, Hg, Na, with the exception of mercury, are all solid at the ordinary temperature, possess a metallic lustre, and are usually good conductors of heat and electricity. The non-metals, H, O, N, C, S, P, Cl, Br, &c., may be gases, liquids, or solids at the ordinary temperature; very few, e.g. C and I, possess a metallic lustre; as a rule they are bad conductors of heat and electricity. The majority form definite stable compounds with hydrogen, whereas the metals do not. It is somewhat difficult to say whether certain elements, like As and Sb, should be placed with the metals or non-metals, and hence they are sometimes placed in a special group termed *metalloids*.

The modern classification of the elements is termed the 'periodic' classification. It is based on Newlands's law of octaves (1864), which has since been developed by Lothar Meyer and Mendelejeff. According to Newlands, if the elements are arranged in the order of increasing atomic weight, then the 8th element resembles the 1st, the 9th the 2nd, and so on.

H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe

In the time of Newlands the number of elements known was small, and the atomic weights assigned to them were often incorrect, but with increasing progress the value of the law became more marked. The table of classification drawn up by Mendelejeff was based on Newlands's law.

According to Mendelejeff, the properties of the elements, as well as those of their compounds, are periodic functions of the atomic weights of the elements. Mendelejeff was able to show that certain atomic weights, then generally accepted, were incorrect, as the old atomic weights would not bring the elements into their proper positions, e.g. he altered indium from 76 to 114, beryllium from 13.8 to 9.2. Mendelejeff was also enabled to predict the properties of elements then not known but since discovered; the best-known examples are scandium, gallium, and germanium. According to this classification, we see that elements with similar properties fall into the same group, e.g. F, Cl, Br, and I

together; N, P, As, and Sb in the same group or family; Ba, Ca, Sr, and Mg and S, Se, and Te. Again, the elements of each group exhibit, as a rule, the same valency.

PERIODS

	I	II	III	IV	V	VI	VII
Even Series.	0 1 2 3 4 5 6 7	He Li Be	Ne Na Mg	A K Ca Sc Ti V Cr Mn	Kr Rb Sr Y Zr Nb Mo	Xe Cs Ba La Ce	Yb Ta W Th U
Transition Elements.	8		1				
Odd Series.	1 2 3 4 5 6 7	B C N O F	Al Si P S Cl	Cu Zn Ga Ge As Se Br	Ru Rh Pd Ag Cd In Sn Sb Te I	Os Ir Pt Au Hg Tl Pb Bi	

The compounds of the elements with oxygen are termed *oxides*, and these are usually divided into basic oxides, acidic oxides, and peroxides. The basic oxides are all metallic oxides; they are all capable of neutralizing acids, yielding metallic salts and water. Acidic oxides, or acid anhydrides, as they are termed, are either the oxides of non-metals, e.g. NO₂, SO₃, CO₂, or the oxides of metals rich in oxygen, e.g. CrO₃, Mn₂O₇; as a rule they dissolve in water to strongly acidic solutions, in fact they are the anhydrides of acids, and the majority readily combine with water to yield the corresponding acids. An acid anhydride can combine with a basic oxide to yield a salt, e.g. CaO and CO₂ give CaCO₃, calcium carbonate. Peroxides are all rich in oxygen, e.g. N₂O₄, PbO₂, H₂O₂. As a rule they give up part of their oxygen when heated alone or with sulphuric acid, and they yield chlorine with concentrated hydrochloric acid.

When only one oxide of an element is known, the nomenclature is simple, e.g. CaO is the only common oxide of calcium, and is termed calcium oxide. Barium gives rise to the two oxides, BaO and BaO₂, termed barium oxide and barium peroxide. Iron gives the oxides FeO, Fe₂O₃, and Fe₃O₄, termed ferrous oxide, ferric oxide, and magnetic oxide of iron.

Tin gives the oxides SnO and SnO_2 , termed stannous and stannic oxides. The suffixes *-ous* and *-ic* applied to oxides always indicate that the *-ous* compound contains relatively less oxygen than the *-ic*, and the prefix *per-* indicates an oxide extremely rich in oxygen. The compounds of elements with sulphur are termed sulphides, with bromine bromides, with nitrogen nitrides, &c., e.g. KI is the formula for potassium iodide, and CaC_2 for calcium carbide. Certain elements can combine with oxygen or other elements, yielding four or five distinct compounds, e.g. the oxides of nitrogen, and then the nomenclature is somewhat more complex— N_2O , nitrous oxide; NO , nitric oxide; N_2O_3 , nitrogen trioxide or nitrous anhydride; N_2O_4 , nitrogen tetroxide or nitric peroxide; and N_2O_5 , nitric anhydride or nitrogen pentoxide. The expression anhydride is one frequently met with in connexion with oxides, and indicates that the oxide is an acid anhydride, and when combined with water yields the acid of the same name as the oxide, thus, nitric anhydride and water yield nitric acid. Sulphur dioxide, SO_2 , is often termed sulphurous anhydride, since with water it yields sulphurous acid, H_2SO_3 ; and sulphur trioxide, SO_3 , is termed sulphuric anhydride, as it yields sulphuric acid, H_2SO_4 , with water.

Three extremely important groups of compounds are those known respectively as *acids*, *bases*, and *salts*. Boyle grouped together as acids all compounds which possessed an acid taste, and were capable of turning certain blue vegetable dyes (litmus, &c.) red, and of decomposing wood ashes. According to Lavoisier, oxygen was a necessary constituent of acids (hence the name *oxygen*, or acid producer, for this element), but it is now known that hydrogen and not oxygen is the essential constituent. Acids are thus particular compounds of hydrogen, and their characteristic property is that either the whole or part of the hydrogen they contain can be replaced by metals (metallic radicles) when the acid is treated with a metal, or a metallic oxide or hydroxide. Thus sulphuric acid, H_2SO_4 , with moist cupric oxide, CuO , yields a compound in which the whole of the hydrogen of the acid is replaced by the cupric radicle, and we have CuSO_4 , cupric sulphate. Similarly, nitric acid, HNO_3 , with potassium hydroxide, yields potassium nitrate, KNO_3 .

Hydrochloric acid, HCl , with calcium hydroxide, yields calcium chloride, CaCl_2 . This reaction between an acid and a metallic hydroxide is often termed neutralization, as by this process the acid properties are destroyed, and a compound known as a salt is formed. Most acids possess the characteristic properties mentioned above, and also evolve hydrogen when mixed with metallic magnesium, or carbon dioxide when mixed with sodium carbonate.

The majority of acids which contain oxygen—the oxy-acids as they are sometimes termed—decompose into water and an acid anhydride when strongly heated, e.g. H_2SO_4 into H_2O and SO_3 , carbonic acid into H_2O and CO_2 , silicic acid, H_2SiO_3 , into H_2O and SiO_2 (silica).

The modern view of acids is that they are hydrogen compounds which in aqueous solution are dissociated or ionized into hydrogen ions, which carry a positive charge of electricity, and other ions, which carry negative charges. Thus HCl in aqueous solution is supposed to give H^+ and Cl^- ions, H_2SO_4 gives H^+ and SO_4^{--} ions, nitric acid HNO_3 gives H^+ and NO_3^- ions. The characteristic acidic properties of solutions of acids are thus generally attributed to the presence of the free hydrogen ions contained in the solution. Ions with positive charges are usually termed *cations*, and those with negative charges *anions*. Different ions can carry one, two, three, or more charges, but in any given solution the sum of positive charges must equal the sum of negative, since the solution as a whole is electrically neutral. The expression 'acid radicle' or 'salt radicle' is often used for the anion when deprived of its charge, thus SO_4 (without any charge) is the sulphate radicle, NO_3 the nitrate radicle, &c. An acid is thus a compound of hydrogen with an acid radicle such that when dissolved in water the hydrogen radicles take up positive charges of electricity, and the acid radicles negative charges.

Bases.—This expression is now generally restricted to the metallic hydroxides, which are capable of reacting with acids to form water and salts. A metallic hydroxide is the hydrated oxide, e.g. calcium hydroxide, Ca(OH)_2 , is CaO plus water; or it may be defined as the compound formed by the union of a metallic radicle with one,

two, or more hydroxyl (OH) groups or radicles, e.g. KOH, NaOH, Ba(OH)₂, Al(OH)₃, &c. A few of these hydroxides—of which caustic soda, or sodium hydroxide, NaOH, and the corresponding caustic potash, KOH, are the best-known examples—are readily soluble in water, and yield strongly alkaline solutions. Such bases are very stable, and cannot readily be decomposed into water and oxide; they are usually termed alkalis. According to the modern theory of solutions, alkalis, when dissolved in water, give rise to metallic ions with positive charges, and hydroxyl ions with negative charges, e.g.

NaOH gives Na^+ and OH^- , Ca(OH)_2 gives Ca^{++} and 2OH^- , and the alkaline properties of all such solutions are attributed to the presence of these free hydroxyl ions.

Salts are often defined as the products formed by the neutralization of an acid by a base, water being also formed. They may also be regarded as the products formed by the union of a metallic with an acid radicle. Thus common salt, sodium chloride, NaCl, according to the first view, is the product formed, together with water, by the neutralization of hydrochloric acid with caustic soda, and according to the second view it is the compound of the sodium radicle Na with the chloride radicle Cl. Salts, like acids and bases, when dissolved in water, are supposed to undergo dissociation into positively charged ions (cations) and negatively charged ions (anions). It is the metallic radicle which takes on the $+$, and the acid radicle which takes the $-$. Thus NaCl in aqueous

solution gives rise to Na^+ and Cl^- ions, KNO_3 gives K^+ and NO_3^- ions, and Na_2SO_4 gives Na^+ and SO_4^{--} ions. Many salts are practically insoluble in water, e.g. barium sulphate, BaSO₄, silver chloride, AgCl.

The nomenclature of salts is fairly simple, and is based on the metallic and acid radicles present. Thus salts derived from potassium hydroxide are termed potassium salts. When a metal gives rise to two distinct sets of salts (e.g. copper gives the two chlorides Cu₂Cl₂ and CuCl₂), it is usual to term these *-ous* and *-ic* salts, e.g. Cu₂Cl₂ cuprous chloride, CuCl₂ cupric chloride. The name for the salts also indicates the relationship of the salt to the acid from which it is derived. Thus

all salts of sulphuric acid are called *sulphates*; of nitric acid, *nitrates*; of carbonic acid, *carbonates*, &c. All salts of sulphurous acid are termed *sulphites*, of nitrous acid, *nitrites*, &c.

The formulæ H₂SO₄ sulphuric acid, Na₂SO₄ sodium sulphate, CaSO₄ calcium sulphate, Al₂(SO₄)₃ aluminium sulphate, PbSO₄ lead sulphate, CuSO₄ cupric sulphate—HNO₃ nitric acid, KNO₃ potassium nitrate, Ba(NO₃)₂ barium nitrate, Bi(NO₃)₃ bismuth nitrate—H₂SO₃ sulphurous acid, Na₂SO₃ sodium sulphite, CaSO₃ calcium sulphite—readily show the relationship between an acid and its salts, and also indicate the fact that an acid, and the salts derived from it, contain the same acid radicle, e.g. SO₄ in sulphates, NO₃ in nitrates, and SO₃ in sulphites.

All the salts mentioned above are termed *normal*, or sometimes *neutral*, salts. They are the salts derived from an acid by the replacement of the whole of its replaceable hydrogen by metallic radicles. Another group is composed of the *acid salts*, which may be regarded as derived from the molecule of an acid containing several replaceable hydrogen atoms by the replacement of only part of this hydrogen by metallic radicles. Thus carbonic acid gives NaHCO₃, sodium bicarbonate, and Ca(HCO₃)₂, calcium bicarbonate. Phosphoric acid, H₃PO₄, yields the acid salts NaH₂PO₄, Na₂HPO₄, and CaHPO₄.

At the present time the study of chemistry is usually dealt with under the various headings Inorganic Chemistry, Physical Chemistry, Organic Chemistry, Physiological Chemistry, Analytical Chemistry.

Inorganic Chemistry deals with the elements and the compounds which they form with one another, with the exception of the carbon compounds, which belong to the province of organic chemistry. One extremely important fact which has been established experimentally with regard to the formation and decomposition of compounds is that during these operations matter is not lost; or, in other words, the weight of a compound formed is equal to the sum of the weights of the simpler substances from which the compound is formed; or in the case of a decomposition, the sum of the weights of all the products is equal to the weight of the original complex substance. The whole science of chemistry is founded on this principle, which is known as the *Law of the Con-*

servation of Matter. Most of the analyses and syntheses carried out in the laboratory can be represented by means of chemical equations. On the one side of such an equation we write the formulæ for the original substance or reacting substances, and on the other side the formulæ for the products, with the sign = between. Thus, in the combination of iron and sulphur to form ferrous sulphide, we write the equation $\text{Fe} + \text{S} = \text{FeS}$, or in the reaction between zinc and dilute sulphuric acid we write $\text{Zn} + \text{H}_2\text{SO}_4 = \text{H}_2 + \text{ZnSO}_4$. No equation can be correct unless the number of atoms of an element on one side of the equation is the same as the number of atoms of the same element on the opposite side, as otherwise the law of conservation of mass could not hold good.

The decompositions met with may be brought about by various means, the commonest being heat, electricity, and chemical reagents. As examples of substances which are decomposed when raised to a relatively high temperature, we have red oxide of mercury decomposed into metallic mercury and oxygen, $2\text{HgO} = 2\text{Hg} + \text{O}_2$, a reaction of great historical importance, as it was one of the first methods employed by Priestley (1776) for the preparation of oxygen. Again, potassium chlorate, when heated, yields as final products potassium chloride and oxygen, $2\text{KClO}_3 = 2\text{KCl} + 3\text{O}_2$, a method often used for the preparation of oxygen in the laboratory; and finally, marble or calcium carbonate, when heated, yields lime or calcium oxide and carbon dioxide, $\text{CaCO}_3 = \text{CaO} + \text{CO}_2$, a reaction which is the basis of the common method for the manufacture of quicklime in lime-kilns. Practically all acids, bases, and salts are decomposed by the electric current when in the fused state or in solution. At the present time metallic sodium is prepared by passing an electric current through fused caustic soda; aluminium is manufactured by decomposing its oxide with the electric current; and silver, in ordinary electro-plating, is deposited from solutions of its salts by the electric current. All such decompositions are termed processes of electrolysis. Examples of decompositions by chemical methods are numerous; thus iron, when introduced into dilute sulphuric acid, evolves hydrogen gas, and leaves a solution of ferrous sulphate (green vitriol), $\text{Fe} + \text{H}_2\text{SO}_4 =$

$\text{FeSO}_4 + \text{H}_2$, or a solution of barium chloride added to a solution of sodium sulphate produces a precipitate of barium sulphate, $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 = \text{BaSO}_4 + 2\text{NaCl}$. Such reactions as these, which, according to the equations representing them, consist in the exchange of two radicles, e.g. in the last case, Na_2 and Ba are termed double decompositions. When two aqueous solutions are mixed together, double decomposition occurs. Thus the precipitation of barium sulphate, silver chloride, and ferric hydroxide are represented by the equations $\text{BaCl}_2 + \text{H}_2\text{SO}_4 = \text{BaSO}_4 + 2\text{HCl}$; $\text{NaCl} + \text{AgNO}_3 = \text{AgCl} + \text{NaNO}_3$; and $\text{FeCl}_3 + 3\text{KOH} = \text{Fe}(\text{OH})_3 + 3\text{KCl}$.

Physical Chemistry deals largely with the so-called physical properties of substances—such as melting-point, boiling-point, specific gravity, refractive index, optical activity—and the relationship between such properties and the chemical constitution of the substances. It includes the various methods for determining atomic and molecular weights, the phenomena of thermo-chemistry and electro-chemistry, the laws of mass action, and the rates at which different chemical reactions proceed. Chemical reactions are always accompanied by the evolution or absorption of heat; in the former case, which is much the commoner, the reaction is said to be *exothermic*, and in the latter *endothermic*. These amounts of heat may be measured accurately in a calorimeter, and the results expressed in the form of a thermo-chemical equation, e.g. the equation $\text{Pb} + \text{I}_2 = \text{PbI}_2 + 398 \text{ Cal.}$, indicates that 398 large units of heat are produced during the formation of a gram molecule (461 grams) of lead iodide from its elements.

Organic Chemistry was originally so named from the fact that naturally occurring carbon compounds were supposed to require a vital force for their production; it now deals with the chemistry of all carbon compounds, not merely with those found in organized (plant or animal) tissues. The study of these compounds, the number of which is enormous, is facilitated by the fact that they may be grouped into *homologous series*. Certain compounds which are similar in chemical properties when arranged in increasing order of complexity form a series such that any member differs both from the

preceding and also the succeeding member by the definite quantity CH_2 . Thus in the paraffin hydrocarbons we have CH_4 , C_2H_6 , C_3H_8 , C_4H_{10} , &c.; in the series of fatty acids, CH_2O_2 , $\text{C}_2\text{H}_4\text{O}_2$, $\text{C}_3\text{H}_6\text{O}_2$, $\text{C}_4\text{H}_8\text{O}_2$, &c. The members of any one series resemble one another closely as regards all important chemical characteristics, and may all be prepared by similar methods. They differ largely, however, as regards physical properties. Some may be gases, some liquids, and some solids. Another phenomenon characteristic of carbon compounds is the frequent occurrence of *isomerism*. Thus we have two definite substances—ethyl alcohol, a liquid readily acted on by sodium or acids, and dimethyl ether, a gas which does not react with sodium or acids, and both have to be represented by the same molecular formula $\text{C}_2\text{H}_6\text{O}$; they are said to be *isomeric*. The explanation of this phenomenon is that although both compounds contain the same elements and the same number of atoms, these atoms are arranged differently within the molecules in the two cases; thus it can be shown that in the ethyl alcohol molecule the arrangement is $\text{CH}_3\text{-CH}_2\text{-OH}$, i.e. the two carbon atoms are directly united, five hydrogen atoms are attached to carbon and one to oxygen, and this in its turn is united to carbon; whereas in dimethyl ether the arrangement is $\text{CH}_3\text{-O-CH}_3$, i.e. all six hydrogens are attached to carbon, and the carbons are not directly united together, but are both attached to the atom of oxygen. A problem which the organic chemist has to attack in addition to the analysis of carbon compounds and the determination of molecular weights, is the determination of the constitutions of the various carbon compounds, i.e. to determine in each case the manner in which the atoms are arranged within the molecule. Another problem is the synthesis by laboratory methods of the most useful natural products; this has already been accomplished in the case of benzoic acid, alizarine, indigo, and numerous other substances which are now manufactured on a large scale. Other compounds, such as starch, albumin, &c., have not been obtained artificially.

Physiological Chemistry is the department of chemistry which deals with the composition and chemical constituents of the fluids and solids of animal origin and the changes which take place in animal

bodies. Four elements are almost invariably found in animal matter, carbon, hydrogen, oxygen, and nitrogen. To these may be added many other elements occurring in small quantity, e.g. sulphur, phosphorus, calcium, sodium, potassium, chlorine, and iron. Sulphur occurs in blood and in secretions; phosphorus is found in the nerves, in the teeth as calcium phosphate, and in some fluids. Chlorine occurs throughout the body; calcium is found in bone and in the teeth. Iron occurs as hæmoglobin in blood; sodium also occurs throughout the body, and potassium in muscles and nerves. Many other elements are present, but in still smaller amounts, e.g. silicon, manganese, lead, lithium, &c. Compounds in the human organism are divided into two classes, i.e. organic and inorganic. Of *inorganic substances* water is the most abundant. About two-thirds by weight of the body is water. Other inorganic substances are calcium phosphate, sodium and potassium chloride, &c. *Organic compounds* may be divided roughly into nitrogenous and non-nitrogenous substances. Of the former the chief are albumin, found in blood and lymph; casein, in milk; myosin, in muscle; and gelatine, in bone. Non-nitrogenous substances are usually organic acids and salts, such as formic acid, acetic acid, butyric acid, stearic acid, and starches, fats, and oils. Almost all the substances which occur in the body have been synthesized in recent years, and their properties and action on one another fully examined. The development of this branch of chemistry has been slow, on account of the difficulty of working with living matter, but solid progress has been made, and several recent advances in physiological science have originated in investigations in physiological chemistry. See *Fermentation* (sub-heading *Enzymes*); *Foods and Food Values*; *Proteins*.

Analytical Chemistry deals with the analysis, both qualitative and quantitative, of all kinds of materials. Thus the analytical chemist is required to analyse water in order to determine its suitability for drinking, or other purposes; to examine foods and drugs for impurities; to analyse specimens of minerals, ores, and the metals obtained from them; to analyse and examine the raw materials and the finished products met with in the brewing and sugar-refining industries, in gas manu-

facture, iron and steel works, acid and alkali works, glass and porcelain works, &c. See *Practical Chemistry*.

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Chemists. See *Pharmacy*.

Chemnitz, Martin (1522–1586), German Protestant theologian. Chief works: *Loci Theologici*, a commentary on Melancthon's system of dogmatics, and *Examen Consilii Tridentini*.

Chemnitz, the principal manufacturing town in the Republic of Saxony. The principal manufactures are white and printed calicoes, ginghams, handkerchiefs, woollen and half-woollen goods. There are also extensive cotton-spinning and other mills; dyeworks, printworks, bleach-works, chemical works, and large manufactures of cotton hosiery. The manufacture of machinery is also important. Pop. (1925), 335,982.

Chemulpo, one of the treaty-ports of Korea, exporting beans and ginseng. It is the port of Seoul, the capital, and is connected with it by railway. Pop. 30,000 (11,000 Japanese).

Chenab, a river of India, one of the five rivers of the Punjab. It rises in the Himalayan ranges of Kashmir, and, entering the Punjab near Sialkot, flows in a south-westerly direction till it unites with the Jehlam; length, about 800 miles. At Wazirabad it is crossed by a great iron railway bridge more than a mile long.

Ch'engtu, a city, China, capital of the province of Szechwan. It has an important trade with Tibet. Pop. 800,000.

Chénier, André-Marie de (1762–1794), French poet. In 1790 he joined the moderate section of the Republicans, and made himself offensive alike to the Royalists and Jacobinical party. Being brought before the revolutionary tribunal, he was condemned and guillotined. The poems of Chénier include elegies, and some beautiful odes, of which *La Jeune Captive*, written in prison, is perhaps the best known.

Chénier, Marie Joseph Blaise de (1764–1811), French dramatist and poet, brother of the foregoing. His dramas, *Charles IX*; *Henri VIII*; *Jean Calas, ou l'école des Juges*, full of wild democratic declamation, were received with great applause.

Chenopodiaceæ, a natural order of apetalous dicotyledons, consisting of more or less succulent and halophytic herbs or shrubs. The genus *Chenopodium* consists of weedy plants, common in waste places, and known in Britain by the names of goosefoot, fat-hen, good King Henry, *C. Bonus Henricus*, &c.

Cheops, the name given by Herodotus to the Egyptian despot whom the Egyptians themselves called Khufu. He lived about 2800–2700 B.C. (but according to Petrie about 1000 years earlier), and built the Great Pyramid.

Chephren, or **Cephren**, was the successor of Cheops as King of Egypt, and the builder of the second pyramid. His name is properly Khafra.

Chepstow, a town and port in England, Monmouthshire, on the Wye, 14 miles north by west of Bristol. The high tides of the Wye allow large ships to reach the town. There is anchorage for ships of any size. There is a shipbuilding yard. Pop. (1931), 4303.

Cheque, a draft or bill on a bank payable on presentation. A cheque may be drawn payable to the bearer, or to the order of some one named: the first form is transferable without endorsement, and payable to any one who presents it; the second must be endorsed, that is, the person in whose favour it is drawn must write his name on the back of it. Cheques are a very important species of mercantile currency wherever there is a well-organized system of banking. The regular use of them for all payments, except of small amount, makes the transfer of funds a mere matter of cross-entries and transferring of balances among bankers, and tends greatly to economize the use of the precious metals as a currency. What is called a 'crossed cheque' has two lines drawn across it transversely, with or without the words '& Co.' between. A cheque thus marked can only be paid by the banker on whom it is drawn when presented by some other banker, and the person to whom it is sent can consequently only obtain payment of it through his own bankers. Such cheques are not used in the United States. The stamp duty on British cheques was raised in 1918 from one penny to twopence. The cheque system, which has contributed to the economic development of Great Britain and the United States, was but little known and certainly far from popular in France.

In recent years, however, its vogue as a mercantile currency has increased considerably, and a new law, passed on 2nd Aug., 1917, with regard to forged cheques has strengthened the confidence of the public in such a mode of payment.

Chequers, an estate and mansion in Buckinghamshire, England. The estate, inherited by Lord Lee of Fareham in 1909, was presented to the nation in 1917, to serve as the official country residence of the Prime Minister.

Cher, a river of Central France, a tributary of the Loire, which it enters near Tours; length, 200 miles.

Cher, a department of Central France, formed from part of the old provinces of Berry and Bourbonnais; area, 2819 sq. miles; capital, Bourges. The surface is in general flat, but is diversified in the north by chains of inconsiderable hills. The soil is various, but is fertile in the neighbourhood of the Loire and Allier. The forests and pastures are extensive. More grain and wine are produced than the demands of the inhabitants require. The preparation and manufacture of iron, called Berry-iron, is the principal branch of industry. Pop. (1926), 298,398.

Cherbourg, a fortified seaport and naval arsenal of France, in the department of La Manche. The port is divided into the commercial and naval ports, which are quite distinct. The Port Militaire is accessible at all times of tide for vessels of the largest class, and is fully equipped for all kinds of repair work. There is a great *digue*, or breakwater, stretching across the roadstead, which is protected on the other three sides by the land. The *digue* is 4120 yards long, and is 2½ miles from the harbour. A fort and lighthouse occupy the centre of the *digue*, and there are circular forts at the extremities. The principal industry of the town is centred in the works of the dockyard, the commercial trade and manufactures being comparatively insignificant. Large quantities of eggs are shipped to England. Pop. 33,000.

Cheribon, a seaport in the Island of Java, capital of the province of the same name. The province lies on the coast towards the north-west, produces coffee, timber, areca-nuts, indigo, and sugar, and has about 770,000 inhabitants. The town lies in a deep bay on the north coast, has a well-sheltered roadstead, and is the

residence of a Dutch governor. Pop. 26,790.

Cherkasy, a river-port of Ukraina, government of Kiev, on the Dnieper. Sugar and tobacco are manufactured, and there are sawmills. The trade is in grain, salt, timber, and sugar. Pop. 36,000.

Chernigov, a former Russian government in Ukraina, now a republican province, with an area of 12,649 sq. miles, and a pop. of 1,809,918. It is an undulating plain watered by the Dnieper, and agriculture and cattle-rearing are the chief industries.

Chernigov, a town of Ukraina, a great agricultural centre. Pop. 32,840.

Cherokees. See *Indians, American*.

Cherry (*Prunus Cerdus*), a very ornamental tree, and therefore much cultivated in shrubberies as well as for its fruit. The cultivated varieties are numerous, as the red or garden cherry, the red heart, the white heart, the black cherry, &c. The fruit of the wild cherry, or *gean* (*P. avium*), is smaller than the cultivated variety. According to Pliny, this fruit was brought from Cerasus, in Pontus, to Italy, by Lucullus about 70 B.C. It was introduced into England by the Romans about A.D. 46. There are now over 100 named varieties of cherries in cultivation in English gardens alone. The cherry orchards of Kent are famous. The cherry is used in making the liqueurs Kirschwasser and Maraschino. The wood of the cherry tree is hard and tough, and is very serviceable to turners and cabinet-makers.

Cherry-laurel, the English name of an evergreen shrub, native of Asia Minor. The leaves are used in pharmacy for the preparation of a distilled aromatic water.

Cherso, an island in the Adriatic, yielding wine, olives, and other fruits, and having a pop. of 10,200. It contains a town of the same name; pop. 5000.

Chert, a massive form of crystalline silica, practically identical with flint. Flint is so well known in the white chalk of England that all flints outside this formation have been called chert, including those of Portland and the Carboniferous Limestone. Chert often cements sandstone, as in the bands found in the English Lower Greensand, where it is associated with the remains of siliceous sponges.

Chertsey, a town, England, in Surrey, on the Thames. Bricks and tiles are made,

and vegetables largely cultivated. Pop. (1931), 17,130.

Cherub, one of an order of angels variously represented at different times, but generally as winged spirits with a human countenance, and distinguished by their knowledge from the seraphs, whose distinctive quality is love.

Cherubini, Maria Luigi Carlo Zenobio Salvatore (1760–1842), Italian composer. Among his compositions are: *Ifigenia in Aulide*, *Lodoiska*, *Faniska*, and *Les Deux Journées*. In his later years he gained a lasting fame by his *Coronation Mass*, and more especially his well-known *Requiem*.—Cf. E. Bellasis, *Cherubini*.

Cherusci, an ancient German tribe, whose territory probably was situated in that part of Germany lying between the Weser and the Elbe, and having the Harz Mountains on the north and the Sudetic range on the south.

Chervil, the popular name of umbelliferous plants of the genus *Chærophyllum*, but especially of *C. temulum*, the only British species, a hairy weed with longish grooved fruits. Garden chervil is used in soups and salads.

Chesapeake Bay, a large bay of North America, in the states of Virginia and Maryland. Its entrance is between Cape Charles and Cape Henry, 16 miles wide, and it extends 180 miles to the northward. It is from 10 to 30 miles broad, and at most places as much as 9 fathoms deep, affording many commodious harbours and a safe and easy navigation. It receives the Susquehanna, Potomac, and James River. It is connected with Delaware Bay by canal.

Chesham, a market town of England, Buckinghamshire, with manufactures of utensils from beech, which grows abundantly in the district. Extensive water-cress beds are also to be found here. Pop. (1931), 8809.

Cheshire, a maritime county and county palatine of England, bounded by the counties of Lancaster, York, Derby, Stafford, Salop, Denbigh, Flint, the estuaries of the Dee and Mersey, and the Irish Sea. The area is 657,950 acres, of which only a sixteenth is uncultivated. The surface is generally level, the soil mostly a rich reddish loam variously clayey or sandy. There is some of the finest pasture-land in England; and cheese is made in great quantities. Extensive

tracts of land are cultivated as market gardens, the produce being sent to Liverpool, Manchester, and other towns. Minerals abound, especially rock-salt and coal, which are extensively worked. Cotton manufacture is carried on at Stockport, Stalybridge, and the north-eastern district, shipbuilding at Birkenhead and other places. Trade is facilitated by numerous railway lines and a splendid system of canals. The chief rivers are the Mersey, the Dee, and the Weaver. The principal towns are Chester, the county town, Macclesfield, Stockport, Birkenhead, and Stalybridge. Pop. (1931), 1,087,544.—BIBLIOGRAPHY: C. E. Kelsey, *Cheshire* (Oxford County Histories); Victoria County History, *Cheshire*.

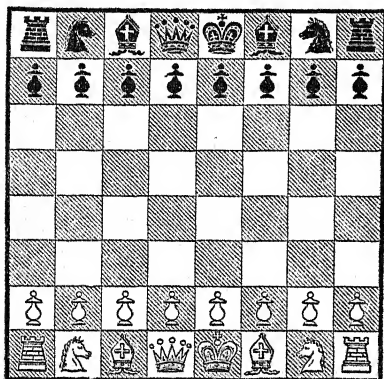
Cheshunt, a town of England, in the south-east of Hertfordshire, with nurseries and market gardens, brick-fields, &c. Pop. (1931), 14,651.

Chess, a game of skill of very ancient origin, was probably first played in India; it passed thence in the sixth century to Persia, became known to the Arabians, and was introduced into Europe before 1100. Both the name of the game and the terms employed in play are obviously of Eastern origin; *chess* being derived, through the O.Fr. *eschecs*, from the Pers. *sháh*, a king; *rook* from *roka*, Sanskrit for ship or chariot; and *checkmate* from *sháh mât*, Persian for *the king is dead*. The game is played by two opponents on a board divided into sixty-four squares, arranged in eight rows of eight squares each, the squares being black (or red) and white alternately. Each player has sixteen men, eight of which, called *pawns*, are of the lowest grade; the other eight, called *pieces*, are of varying value and power. The pieces include, for each player, *king* and *queen*; two *bishops*, two *knight*s, and two *rooks* or *castles*. The board is placed so that each player has a white square on his right hand in the row nearest to him. The men are then set out on the two rows of squares next to the player owning them, the pieces on the row nearest him, the pawns on the next row, four rows being thus left vacant between the two opposing rows of pawns. The king and queen occupy the two central squares, and face the king and queen on the opposite side. The queen, at the commencement of the game, always stands on her own colour, white queen on white

square, black on black. The two bishops are placed on the squares next the king and queen, the two knights next the bishops, with the rooks in the corner squares. The pawns, all equal in value, fill the front or second row. The men standing on the king's or queen's side of the board are named respectively king's and queen's men. Thus king's bishop or knight is the bishop or knight on the king's side of the board. The pawns are named from the pieces before which they stand—king's pawn, king's knight's pawn, queen's rook's pawn, &c. The names of the men are contracted as follows: King, K.; King's Bishop, K.B.; King's Knight,

and K.Kt. square, and the moves of each player are described throughout from his own position in inverse order to the moves of his opponent.

In chess all the men capture by occupying the position of the captured man, which is removed from the board, and all captures are optional. The ordinary move of a *pawn* is straight forward in the same file; it never moves backward. The first time a pawn is moved it may be played forward one square or two; afterwards one square only at a time. But in taking an adverse piece the pawn moves diagonally and occupies the position on which the captured man stood. Thus, if White opens a game by playing P. to K.4, and Black answers with P. to K.4, the two pawns are immovable, being unable either to advance or to take each other. But if White now plays P. to K.B.4, or P. to Q.4, Black may capture the P. last advanced. Pawns have a further mode of capture peculiar to themselves and available against pawns only. This may be illustrated by an example. If Black's P., instead of occupying K.4, stood on K.5, and White played P. to Q.4, Black could not capture it by placing his P. on the square it occupies, which would be a false move; but he is at liberty to effect the capture by placing his own P. on the square (Q.6) which White's P. has passed over. This is called *taking en passant*, and must be done, if at all, on the next move after P. to Q.4. When a P., by moving or capturing, reaches the eighth square of any file, it no longer remains a P., but is exchanged for a piece. The player may choose any piece except the king, but the queen, as the most valuable, is usually selected. This exchange is called *queening* a pawn, and a player may thus have more than one queen on the board. *The Rook*.—The moves of the *pieces* are not, like those of pawns, limited to a single direction. The R. moves in any direction, and for any distance that is open, along either the row or the file on which it stands—horizontally or perpendicularly to the player, backwards or forwards, to the right or left. It can capture any obstructing man and occupy its place. *The Bishop*.—The B.'s like the R.'s are unlimited in range and can move either backward or forward; but that movement is diagonal, and thus a bishop which commenced the game on a white square never



Chess-board

K.Kt.; King's Rook, K.R.; Queen, Q.; Queen's Bishop, Q.B.; Queen's Knight, Q.Kt.; Queen's Rook, Q.R. The pawns are contracted: K.P., Q.P., K.B.P., Q.Kt.P., &c. The board is divided, inversely from the position of each player, into eight rows and eight files. Counting from White's right hand to his left, or from Black's left to his right, each file is named from the piece which occupies its first square, and, counting inversely from the position of each player to that of the other, the rows are numbered from 1 to 8. At White's right-hand corner we thus have K.R. square; immediately above this K.R.2, and so on to K.R.8, which completes the file; the second file begins with K.Kt. square on the first row, and ends with K.Kt.8 on the eighth. White's K.R.8 and K.Kt.8 are thus Black's K.R. square

leaves that colour, and is powerless against a man on a black square. *The Queen*.—The Q. combines the moves of the R. and B. She is the most powerful piece on the board, and can move to, or capture at, any distance or direction in a straight or diagonal line. *The King*.—The K. is at once the weakest and the most valuable piece on the board. In point of direction he is as free as the Q., but can move only one square at a time; standing on any middle square, he commands the eight adjoining squares and those only. In addition to his ordinary move, the K. has a further privilege, shared by the R. Once in the game, provided that the squares between the K. and R. are clear, that neither K. nor R. has moved, that K. is not attacked by any hostile man, and that no attack commands the square over which K. has to pass, K. may move two squares towards either K.R. or Q.R., while R., in the same move, is placed on the square over which K. has passed. This is called *castling*, and often serves as a considerable protection to K. *The Knight*.—The Kt., unlike all other pieces, never moves in a straight line. His move is limited to two squares at a time, one forwards, backwards, or sideways, and one diagonally, and he can leap over any man occupying an intervening square. He thus always changes the colour of his square after every move. The Kt., like the K., when on a central square, commands eight squares, but they are all at two squares' distance, and are in an oblique direction.

The definite aim in chess is the reduction to surrender of the opposing king. The K. is inviolable to the extent that he cannot be captured, but he can be put in such a position that he would be captured were he any other piece. Notice of any direct attack upon him must be notified by the adversary saying 'Check!' and, the K. being attacked, all other moves and plans must be abandoned, and other men, if necessary, sacrificed, in order that he may be removed from danger, the attack covered by the interposition of a man—a course not possible when the attacker is a Kt.—or the assailant captured. It is also a fundamental rule of the game that the K. cannot be moved into check. When the K. can no longer be defended on being *checked* by the adversary, either by retiring from the dangerous square, by interposition of other

men, or by capture of the assailing piece or pawn, the game is lost, a result announced by the victor calling 'Check-mate!' When, by inadvertence or want of skill, a player blocks up his opponent's K. so that he cannot move except into check, and no other man can be moved without the K.'s being exposed, the player reduced to this extremity cannot, without violating the fundamental rule above referred to, play at all. In such a case, which is known as *stalemate*, the one player being unable to play and the other out of turn, the game is considered *drawn*, without advantage to either side. If two K.'s remain alone on the board together, all other men having been captured, a similar result is arrived at, neither being unable, without assistance, to checkmate the other. The laws of the game should be studied in a special manual; one of the best codes will be found in Staunton's *Chess Praxis*.—BIBLIOGRAPHY: H. Staunton, *Chess Player's Handbook*; *Chess Theory and Practice* (edited by R. T. Wormald); H. J. R. Murray, *History of Chess*; J. Mason, *The Art of Chess*; P. C. Morphy, *Morphy's Games of Chess*; E. Lasker, *Chess Strategy*. (See Lasker.)

Chester, an English episcopal city, county of a city, and county town of Cheshire, situated on the Dee about 16 miles from Liverpool. It is a town of antique and picturesque appearance. Chester has manufactories of lead pipes, boots and shoes, and has iron-foundries and chemical-works. The port has been improved of late years, and there is now accommodation for vessels of two or three thousand tons. Navigation of the Dee is dangerous. Pop. (1931), 41,438.

Chester, a city of Pennsylvania, U.S.A., on the Delaware. The chief industries are shipbuilding and the manufacture of cotton and woollen goods. Pop. 58,030.

Chesterfield, Philip Dormer Stanhope, Earl of (1694–1773), English statesman and author. In 1728 he was Ambassador to Holland, in 1744 Lord-Lieutenant of Ireland, and in 1746 Secretary of State. He obtained some reputation as an author by his *Letters to his Son* (1774). Chesterfield's *Letters to his Godson* were published in 1890. These writings combine wit and good sense with great knowledge of society.—Cf. W. H. Craig, *Life of Lord Chesterfield*.

Chesterfield, a borough, England,

Derbyshire. Its church has a remarkable twisted spire, made of wood covered with lead. Principal manufactures are gingham, lace, and earthenware, but there are collieries, iron-mines, and blast-furnaces in the vicinity. Pop. (1931), 64,146.

Chester-le-Street, a town of England, in the county of Durham. It has coal-mines and ironworks. Pop. (1931), 16,639.

Chesterton, Gilbert Keith (1874–), British author, journalist, and critic. His works include: *Greybeards at Play*, *Browning*, *The Napoleon of Notting Hill*, *Dickens*, *The Man Who was Thursday*, *Tremendous Trifles*, various *Father Brown* books, *Manalive*, *The Crimes of England*, *The Superstition of Divorce*, *What I saw in America*, *Tales of the Long Bow*, *R. L. Stevenson*, *The Poet and the Lunatics*, *Catholic Essays*, *The Four Faultless Felons*.

Chesterton, an urban district forming a suburb of Cambridge, England. Boat-building and tile-making are carried on. Pop. (1931), 26,877.

Chestnut, a genus of plants, order Fagaceae. The sweet or Spanish chestnut (*Castanea sativa*) is a stately tree, with large, handsome, serrated, dark-green leaves. The fruit consists of two or more seeds enveloped in a prickly husk. The tree grows freely in Britain, and may reach the age of many centuries. The timber is inferior to that of the oak, though very similar to it in appearance. Two American species of chestnuts, *C. americana* and *C. pumila* (the latter a shrub), have edible fruits. The former is often regarded as identical with the European tree. The name of Cape Chestnut is given to a beautiful tree of the rue family, a native of Cape Province. The Moreton Bay Chestnut is a leguminous tree of Australia, *Castanospermum australe*, with fruits resembling those of the chestnut. The water-chestnut is the water-caltrop, *Trapa natans*. The horse-chestnut (introduced into Britain about 1550) is quite a different tree from the common chestnut.

Chevalier, Michel (1806–1879), French economist. His works include: *Lettres sur l'Amérique du Nord*, *Des Intérêts Matériels en France*, *Essais de Politique Industrielle*, *Cours d'Economie Politique*, and *De la Baisse Probable d'Or*. He was known as a strong advocate of free trade, and as a specialist on questions of currency.

Cheviot Hills, a range on the borders

of England and Scotland, stretching southwest to north-east for above 35 miles; culminating point, the Cheviot, 2688 feet. These hills are clothed for the most part with a close green sward, and are pastured by a celebrated breed of sheep.

Cheviot Sheep, a breed of white-faced sheep, taking their name from the well-known Border mountain range extending along the border of Northumberland and Roxburghshire, noted for their large carcass, prime quality of mutton, and valuable wool used in the manufacture of Cheviot tweeds, which qualities, combined with a hardness second only to that of the black-faced breed, constitute them the most valuable race of mountain sheep in the kingdom.

Chevron, an heraldic and ornamental form variously used. In heraldry, the chevron is an ordinary supposed to represent two rafters meeting at top. A similar form is used for the distinguishing badge worn on the arm of a non-commissioned officer in the British army, one chevron denoting a lance-corporal, two a corporal, three a sergeant, and three and a crown a company quartermaster-sergeant. During the European War (1914–1918) the War Office sanctioned the issue of chevrons for overseas service. Anyone who had proceeded overseas was entitled to wear a chevron, with an additional one for every complete twelve months' service overseas. The chevrons were worn on the right forearm, and were blue in colour; but anyone who had proceeded overseas prior to 31st Dec., 1914, was entitled to a red chevron.

Cheyenne, a town of the U.S.A., capital of the state of Wyoming. It is a railway centre, and is in a coal and iron district. Pop. 13,829. The River Cheyenne, a tributary of the Missouri, is formed by two branches, the N. Fork and the S. Fork, which rise in this state.

Cheyenne. See *Indians, American*.

Cheyne, Thomas Kelly (1841–1915), English Biblical critic. His publications include: *Commentaries on Isaiah* (1884), *Founders of Old Testament Criticism* (1894), *Critica Biblica* (1904), and *The Veil of Hebrew History* (1913). He also edited, together with J. S. Black, the *Encyclopædia Biblica*.

Chiana, a river and valley, Italy, in Tuscany and Umbria. The river is artificially divided into two branches, the one flowing into the Arno, the other into the

Paglia. The valley, which has been drained, is one of the most fertile in Italy.

Chianti. See *Wines and Spirits*.

Chiapas, a state of Mexico, on the Pacific coast; area, 27,527 sq. miles. It is in many parts mountainous, is intersected by the River Chiapas, and covered with immense forests. The valleys are fertile, and produce much maize, sugar, cacao, and cotton. Trade is, however, quite undeveloped on account of the lack of roads. The capital is Tuxtla-Gutierrez. Pop. 417,722.

Chiaromonte, a town of Sicily, province of Syracuse, on a hill in a highly fertile neighbourhood. Pop. 10,000.

Chiari, a town of Northern Italy, province of Brescia, with manufactures of silk. Pop. 12,489.

Chiasolite, a mineral, a variety of andalusite formed where slaty rocks have been altered by igneous intrusions, and characterized by a regular arrangement of carbonaceous impurities within its crystals. It is found in most countries along granite contacts, and on a large scale at Bimbowrie in South Australia.

Chiavari, a seaport, Italy, in the province of Genoa, in a district productive of wine, olives, and silk. Pop. 13,700.

Chicacole, a town of India, in the Ganjam district, Madras Presidency, notable for its fine muslin manufactures. Pop. 17,850.

Chicago, a city of Illinois, U.S.A., on the south-west shore of Lake Michigan. It stands on a level plain, and is surrounded by a beautiful and fertile country. The Chicago River and its two branches separate the city into three unequal divisions, connected by numerous bridges and two tunnels under the river. There is a university, opened in 1892, and a large number of higher-class colleges and seminaries. The city water-supply is conveyed by tunnels from Lake Michigan, and there are also several artesian wells. From its position at the head of the great chain of the American lakes, and at the centre of a network of railroads communicating with all parts of the Union, Chicago has always been more a commercial than a manufacturing city. There is dock, dry-dock, and wharf accommodation for the largest vessels. The industries include iron-founding, brewing, distilling, leather, hats, sugar, tobacco, agricultural implements, steam-engines, and footwear. It

has an enormous trade in pork-packing, and is the greatest market for grain and timber in America. Other articles for which it is a centre of trade are flour, provisions, wool, hides, soft goods, and clothing. Pop. 2,701,705.—BIBLIOGRAPHY: A. T. Andreas, *History of Chicago*; J. S. Currey, *Chicago: its History and its Builders* (5 vols.).

Chichester, an episcopal city of England, county of Sussex. Its old wall, still in good preservation and lined with lofty elms, gives it a very picturesque appearance. The city has a good trade in coal and agricultural produce, and carries on brewing and tanning. Pop. (1931), 13,911.

Chickahominy, a river in Virginia, U.S.A., rising about 20 miles north-west of Richmond, flowing south-east till it joins the James River.

Chickasaw Indians. See *Indians, American*.

Chicken-pox (Varicella), an infectious disease mainly confined to children. It commences with feverishness, and an eruption of pimples, which speedily become blebs filled with clear fluid and as large as split-peas. Within a week these dry up into dark-coloured scabs, which within another week have fallen off. The disease is never fatal, and has no evil results. A little opening medicine and a mild diet is all the treatment required.

Chick-pea, the popular name of *Cicer arietinum*, which grows wild, and is cultivated, in many parts of the East. It is an important article in French and Spanish cookery under the name of *pois chiche*, or *gervance*. When roasted it is the common *parched pulse* of the East.

Chickweed, the popular name of *Stellaria media*, order Caryophyllaceæ, one of the most common weeds in cultivated and waste ground everywhere in Britain, flowering throughout the year, and is much used for feeding cage-birds.

Chiclana, a town, Spain, Andalusia. It has manufactures of linen and earthenware. The sulphur baths are good for skin-diseases, and are much frequented. Pop. 11,496.

Chiclayo, a town of Peru, province of Lambayeque, in an important sugar area. Pop. 13,000.

Chicopee, a town of Massachusetts, U.S.A., on the River Connecticut, with manufactures of cotton, machinery, and paper. Pop. 36,214.

Chicory (*Cichorium*), a genus of composite plants, including the two important species of *C. Endivia* (endive) and *C. Intybus* (chicory or succory). The *C. Intybus* or chicory is a common perennial plant, from 2 to 3 feet high. The leaves are sometimes blanched, to be used as salad, in the same way as *C. Endivia*.



Chicory (*Cichorium Intybus*)

1, Floret. 2, Seed. 3, Root

But the most important part of the plant is its long, fleshy, and milky root, which when roasted and ground is now extensively used for mixing with coffee.

Chicoutimi, a town, Quebec, Canada, on the Saguenay River. It has large pulp-mills, and the annual export of dry pulp to Britain is over 60,000 tons. New pulp-mills are being built, and there are also lumber-mills, tanneries, machine-shops, and a spinning and weaving factory. It is on the Canadian National Railway. Pop. 8937.

Chiengmai, a town of Northern Siam, capital of a semi-independent Lao state, on a tributary of the Menam, favourably situated as a centre of trade with Burma, South-Western China, &c., the seat of a British consul and an international court. Teak is an important article of trade. Pop. 50,000.

Chieri, a town of North Italy, with

manufactures of cotton, silk, &c. Pop. 15,454.

Chieti, a town, Southern Italy, on the right bank of the Pescara. It has manufactures of woollens. Pop. (1928), 35,849. —The province of Chieti has an area of 1001 sq. miles; pop. (1928), 364,948.

Chiff-chaff (*Phylloscopus collybita*), a bird, so called from its cry, one of the warblers, a summer visitant to England from the Continent, 4 or 5 inches long; inhabits woods and thickets, and destroys many insect larvæ.

Chigoe, or **Jigger**. See *Flea*.

Chihli, one of the northern provinces of China, watered by the Pei-ho, containing Peking, the capital, though Tientsin is the chief town of the province. Area, 115,800 sq. miles; pop. 22,970,000.

Chihuahua, a city, Mexican Confederation, capital of the state of the same name, supplied with water by a famous aqueduct. It is surrounded by silver-mines, and is an important entrepôt of trade, Pop. (1921), 37,071. —The state is bounded on the north by the United States and on the north-east by the Rio Grande del Norte, has a healthy climate, and is rich in silver-mines. Area, 90,036 sq. miles; pop. (1921), 401,622.

Child Labour Regulations. It was not until the beginning of the nineteenth century that the question of the regulation of the industrial employment of children was seriously considered. By the Chimney Sweepers' Chimneys Regulation Act, 1840, as amended by the Acts of 1854 and 1875, it is made illegal to allow any person under 21 years of age to sweep chimneys. The first Factory Act, restricted to the protection of apprentices in cotton and other mills and factories, was passed in 1802. The Factory and Workshops Acts of 1901 to 1921 supply the main regulations governing the employment of child labour in factories and workshops. Under the Act of 1901 no child under 12 years of age may be employed in any factory or workshop; it provides for half-time attendance at school and half-time employment between the ages of 12 and 14. In certain cases children of 13 who have made a limited number of attendances at school and have passed an educational test may get special exemption and become whole-time workers. The Act makes it illegal for children and young persons to work at night, and limits the

hours of their employment, e.g. in textile factories to ten per day, exclusive of meal-times, with not more than four and a half hours' work without a break.

By the Coal Mines Act, 1911, the employment of any boy under the age of 14 and of any woman or girl in any mine below ground was prohibited. The Education Act of 1921 gave power to local education authorities to make by-laws regulating in certain respects the employment of children under the age of 14 and street-trading by children under 16. By the same Act it is made a criminal offence to cause or allow a boy under the age of 14, or a girl under the age of 16, to be in any street or in any premises licensed for the sale of any intoxicating liquor (other than premises licensed according to law for public entertainment) for the purpose of singing, playing or performing, or being exhibited for profit, or offering anything for sale between 9 p.m. and 6 a.m., but no child under 12 is allowed to perform or be exhibited for profit in similar circumstances at any hour. Some latitude may be allowed in certain circumstances by competent local authorities. Special regulations are made in regard to children who are to be trained for acrobatic or other dangerous performances.

Protection of children in industry was discussed at the Conference of the International Labour Organization of the League of Nations held at Washington in 1919, and in 1920 at a conference at Geneva. In 1920 the Women, Young Persons and Children (Employment) Act in Great Britain was passed. This Act makes it illegal for any child under the age of 14 to be employed in any industrial undertaking other than an undertaking in which only members of the same family are employed. It also makes it compulsory for employers to keep a register of all persons under the age of 16 employed by them, and of the dates of their birth. In connexion with the employment of children at sea, each of these conditions has to be fulfilled.

The Merchant Shipping Act regulated apprenticeship in the sea service and sea fishing service.

Children, Cruelty to. Societies for the prevention of cruelty to children were first instituted in America, and about 1883 to 1884 they were introduced into England. Up to the year 1889 there was

no special legislation for the prevention of cruelty to children, but in 1889 a special Act was passed to prevent cruelty to children. This was followed by various enactments, and the law as to the protection of children is now to be found in the Children Acts, 1908 to 1913. Cruelty to a child is a crime, and is committed if any person over the age of 16 who has the custody, care, or charge of any child under that age wilfully assaults, ill-treats, neglects, abandons, or exposes such child (or causes or procures to be done any of these things) in a manner likely to produce unnecessary suffering to the child or injury to its health, including injury to or loss of sight, hearing, limb, or organ of the body, and any mental derangement. For these offences, if the offender is convicted on indictment, i.e. on trial by jury at assize or quarter sessions, the punishment may be a fine not exceeding £100 or imprisonment for not more than two years with or without hard labour; if the offender is summarily convicted, the punishment may be a fine not exceeding £25 or imprisonment for not more than six months with or without hard labour. In all cases the sentence may include both fine and imprisonment. If the person guilty of cruelty has a pecuniary interest in the child's death, the penalty may be increased to £200 or five years' penal servitude. It is forbidden to cause or allow children under 16 to receive alms on the street or elsewhere, whether under pretence of singing, playing, offering for sale, or otherwise. A constable is authorized to take into custody without warrant persons committing in his presence certain offences against the Act when name and residence are unknown and cannot be ascertained. The Court may order that the child be taken out of the custody of the person convicted or bound over to keep the peace and handed over to the charge of a relative or some other fit person; and an offending parent may be compelled to contribute to the child's maintenance. The Acts, of course, do not interfere with the right of parents, guardians, or teachers to administer due punishment. Much has been and is done to prevent cruelty to children and bring offenders to justice.

Children, Laws relating to. The civil status, or capacity of children to acquire rights and incur obligations, whether

through contract or delict, is left mainly to the common law. (See *Age; Infant; Guardian; Minor.*) As regards damages for delict or negligence, children are in the same position as adults. Actions for damages by children are common, and in these 'contributory negligence' is not an effectual defence, unless the child was intelligent enough to realize the danger. The law relating to children's welfare is mainly statutory, the leading Act being the Children Act (1908), by which the practice of putting children under 7 out to nurse is restricted and controlled, and severe penalties are imposed for cruelty, including neglect, inadequate feeding and clothing, &c.; also for allowing children to beg in public, and exposing them to physical and moral dangers, including smoking. The sale of intoxicating liquor to children is forbidden under the same Act. (For legislation dealing with children in industry, see *Child Labour Regulations.*) Criminal responsibility cannot attach to a child under 7. Above that age, however, there is no essential difference between children and adults, except in the matter of punishment. The Children Act (1908) prohibits death sentence, and also forbids imprisonment and penal servitude, except in special cases, for children under 16, and in lieu thereof provides special punishments, e.g. whipping, or detention in reformatories or industrial schools. By the Prevention of Crimes Act (1908), since amended by the Criminal Justice Acts of 1914 and 1925, somewhat similar provision is made for detention in Borstal institutions of offenders between the ages of 16 and 21.

Child Welfare. See *Infant Mortality.*

Chile, a republic of South America extending along the Pacific coast in a narrow strip 58 to 273 miles broad, and including part of Tierra del Fuego. It is bounded on the north by Peru, and on the east by Bolivia and the Argentine, from which it is separated by the main ranges of the Andes. The total length is 2661 miles, the area is 290,119 sq. miles, and the population is 3,892,241. For administrative purposes the republic is divided into 23 provinces and one territory. Rivers are numerous but small, and there are several large lakes in the south (Llanquihue, Ranco, &c.). The surface is greatly diversified and rises towards the Andes, along the watershed of which a great

part of the boundary runs. In the north the elevation is often 20,000 feet (Aconcagua is 23,097 feet). In the Chilean Andes there are several active volcanoes, Antuco and Osorno being the chief, and earthquakes are common. There are many islands off the coast, Chiloe being the most important. The climate is on the whole healthy, though in the north there is practically no rainfall. The mineral wealth of Chile is considerable, gold, silver, lead, tin, copper, manganese, zinc, arsenic, coal, &c., being found, while cubic nitre or Chile saltpetre is by far the most important product of the country. More than half the world's supply of iodine comes from Chile. Large areas are incapable of cultivation, but from the 29th degree of latitude southwards there are fertile tracts which become increasingly rich, till in the southern provinces the slopes of the Andes are covered with forests, orchards, and luxuriant herbaceous plants and flowers. Wheat and barley are largely grown, and fruits of all kinds, including grapes, apples, pears, peaches, figs, and oranges, are abundant in the centre and the south. Great numbers of cattle and sheep are raised. Indeed, sheep-breeding is by far the most important industry in the country, and there is a very large export of frozen meat and wool. Commerce is rapidly increasing, in spite of the severe setbacks experienced of recent years on account of general world trade depression. Chile has a larger trade with the United Kingdom than with any other country. Minerals form five-sixths of the total exports, the value of cubic nitre alone reaching, in 1928, the enormous figure of £24,000,000. Next come copper, wool, iodine, and borax. The value of the exports in 1928 was £50,000,000, of which £10,500,000 came to the United Kingdom. The total imports were £30,000,000. The standard of currency is the gold peso (value 6d. stg.). There are over 5600 miles of railway track in Chile, of which the Government owns 3000 miles. Santiago is the capital, and Valparaiso the chief port. Santiago is connected with Buenos Aires by the Trans-Andine Railway. There are 21,097 miles of public road, 1350 miles of navigable rivers and lakes. Several wireless stations are being constructed along the coast, and one has been erected on the Juan Fernandez Islands. Chile originally belonged to the

Incas, from whom it was wrested by the Spaniards. It remained a Spanish colony till in 1810 a revolution commenced. This ended by Chile becoming independent in 1817. Since then it has had several minor wars, notably that with Spain in 1865, and that with Bolivia and Peru in 1879. In this latter conflict Chile gained the sea-coast of Bolivia and two Peruvian provinces. See *Peru, Tacna*. Chile is under a President and a Council of State. The legislature is composed of a Senate and a House of Deputies. Roman Catholicism is the State religion, and education is now compulsory and is well provided for. The Chileans are mostly of Spanish or Indian descent, and are much more industrious than most South American peoples. The Araucanians inhabit the region between the Rivers Biobio and Valdivia.—BIBLIOGRAPHY: J. Perez Canto, *Chile: an Account of its Wealth and Progress*; W. H. Koebel, *Modern Chile*; W. E. Parker, *Chileans of To-day*; G. Subercaseaux, *Monetary and Banking Policy of Chile*.

Chillán, a town, Chile, capital of the province of Nuble, connected by rail with Talcahuano and Santiago. It trades in cattle and grain. Pop. 30,881.

Chillicothe, a flourishing town, Ohio, U.S.A., with manufacturing and other industries. Pop. 16,000.

Chillies. See *Capsicum*.

Chillingworth, William (1602-1644), English divine. He went for a time into the Church of Rome, but afterwards returned to the English Church, and published in 1638 a great work in justification of himself, *The Religion of Protestants a Safe Way to Salvation*.

Chilliwack, a town, British Columbia, on the Fraser River, 70 miles from Vancouver. It is on the Canadian Pacific Railway, and is the terminus of the Vancouver electric railway. It is in a very productive agricultural and fishing district, and has canning, milk-condensing, and cheese factories. Pop. 8000.

Chiloé, a province and island of Chile. The province comprehends the Island of Chiloé, together with a number of other islands, and a portion of the mainland. The Island of Chiloé is for the most part covered with dense forests, but large tracts of it are still unexplored. The chief town is San Carlos. The exports consist chiefly of timber. Area of the province, 6979 sq. miles; pop. 110,331.

Chiltern Hills, a range of flint and chalk hills, England, extending through Oxford, Hertford, and Buckingham shires; loftiest summit, 905 feet. These hills were anciently covered with forests, and were infested by numerous bands of robbers. To protect the inhabitants of the neighbouring districts an officer was appointed by the Crown, called the Steward of the Chiltern Hundreds, and, although the duties and emoluments have long ceased, the office still exists, and is made use of to afford members of the House of Commons (who cannot give up their seats directly) an opportunity of resigning their seats when they desire to do so. Being regarded as an appointment of honour and profit under the Government, the acceptance of it disqualifies a member from retaining his seat. The practice began about the year 1750.

Chimæra, or **Chimera**, in classical mythology, a fire-breathing monster, the fore-parts of whose body were those of a lion, the middle of a goat, and the hinder of a serpent. The name came to be used for an unnatural production of the fancy.

Chimæra, a genus of cartilaginous fishes, and the chief type of the order Holocephali, related to sharks, the best-known species of which is the *Chimæra monströsa*, which inhabits the northern seas, and is sometimes called *king of the herrings*, and, from its two pairs of large teeth, *rabbit-fish*. There is but one gill-opening, and the tail terminates in a point, the fish having altogether a singular appearance. It seldom exceeds 3 feet in length.

Chimborazo, a mountain of Ecuador, about 90 miles south by west of Quito. It rises to the height of about 20,500 feet, and is covered with perpetual snow 2600 feet from the summit and upwards.—*Chimborazo* is also the name of a province in Ecuador; pop. 122,000.

Chimpanzee, the native Guinea name of a large West and Central African ape (*Anthropopithecus troglodytes*) belonging to the anthropoid or man-like monkeys, and to the same genus as the gorilla. When full grown it is sometimes about 5 feet high, with black hair, and is not so large and powerful as the gorilla. Like the orang, it has the hair on its fore-arms turned backwards, but differs from it in having an additional dorsal vertebra and a thirteenth pair of ribs. It walks erect

better than most of the apes. It feeds on fruits, and constructs a sort of nest amongst the branches.

China, an immense Republic stretching from the centre of Asia for 3000 miles to the east coast of Korea, and from the Siberian frontier at the River Amur for 2400 miles south to the Island of Hainan. This vast Republic has an area of 4,279,170 square miles, a population estimated at 440,000,000, and is usually divided into China Proper, the new dominion of Sinkiang (550,340 sq. miles), and the dependencies Manchuria, Fengtien, Kirin, Heilungkiang, Mongolia, and Tibet (total area, 2,194,410 sq. miles). China Proper, known to Marco Polo and earlier travellers by the Tatar name of *Cathay*, called 'Middle Kingdom' by the Chinese, comprises the following provinces:

Province.	Area in Sq. Miles.	Population.	Capital.
Chihli ..	115,800	22,970,000	Tientsin.
Shantung ..	55,970	25,810,000	Chinan.
Shensi ..	81,940	9,420,000	Tai-yuan.
Honan ..	69,830	22,375,000	Kaifeng.
Kiangsu ..	38,600	15,380,000	Chinkiang.
Anhui ..	54,810	14,075,000	Anching.
Kiangsi ..	69,480	10,255,000	Nanchang.
Chekiang ..	36,070	13,950,000	Hangchow.
Fukien ..	46,320	8,560,000	Foochow.
Hupeh ..	71,410	21,260,000	Wuchang.
Hunan ..	83,380	20,580,000	Changsha.
Shensi ..	75,270	6,725,000	Hsian.
Kansu ..	125,450	3,810,000	Lanchow.
Szechwan ..	218,480	54,500,000	Ch'engt'u.
Kwangtung ..	99,970	23,700,000	Canton.
Kwangsi ..	77,200	5,425,000	Kuei-lin.
Kweichow ..	67,160	9,265,000	Kuei-yang.
Yunnan ..	140,680	8,053,000	Yunnan.
Totals ..	1,534,420	302,133,000	

Note.—In dealing with China, no statistics can be taken as more than estimates. This applies particularly to populations.

Nanking has been the capital since 1928. There are many populous cities. The coast-line forms an irregular curve of about 2500 miles. The only gulf of any size is Chihli on the north-east, though there are numerous indentations affording safe and capacious roadsteads. It is characterized by a fringe of islands and islets, the largest of which are Formosa (ceded to Japan in 1895) and Hainan. The Gulf of Chihli, the Yellow Sea, and the China Sea wash the eastern and south-eastern shores. The inland

boundaries are formed mainly by Tongking, Burma, Tibet, and, on the north, partly by the Great Wall separating China from Mongolia. Two-thirds of the interior are estimated to be mountainous. The general slope is from west to east, and the mountains are a continuation of those of Tibet and Central Asia. The great Kunlun range throws off branches which, running eastward between the great valleys of the Hwang Ho and Yangtze Kiang, traverse almost the whole breadth of China. Farther north the Nan-shan branch of the Kunlun range runs under various names along the north-east of China. The third great mountain system is in the south-east, where extensive chains, such as the Nan-shan, the Ta-yu-ling, and Pu-ling, stretch on the south side of the Yangtze Kiang all the way from the highlands of Yunnan to the eastern seaboard. On both sides of the lower Hwang Ho is an immense delta plain, consisting generally of a deep alluvial soil of unparalleled fertility. As they approach the sea-coast the two rivers are connected by the Grand Canal, 700 miles in length, thus completing a magnificent system of inland navigation. Besides these rivers and their numerous tributaries, the most deserving of notice are the Sikiang, having at or near its embouchure Canton, Hong Kong, and Macao; and the Pei-ho, which forms a water-way between Peking and the Gulf of Chihli. There are a number of lakes, mostly of no great size; the largest is Tung-ting, near the centre of China, with a circumference of about 270 miles. The greater part of China lies within the temperate zone, but the climate is excessively hot in summer and cold in winter. In the south the climate is of a tropical character. Among the greatest scourges of the country are the dreadful gales known as typhoons, which never fail to commit great devastation. The Chinese coal-fields are of vast extent, and have an enormous reserve in every province. The main field is in Hunan, and the total annual production is 16,000,000 tons. Iron ore is abundant in Shensi, in Chihli, near Hankow (the rich Tayeh district), and elsewhere. The iron ore reserve of China is about 300,000,000 tons, and the annual output is 1,500,000 tons. There are 91 petroleum wells, mainly in the upper Yangtze Kiang, salt is plentiful, and there are inexhaustible beds of kaolin. Copper ore is plentiful

in Yunnan, tin is mined in the same province, and antimony (annual output 25,000 tons, or 60 per cent of the world's total) comes from Hunan. Gold, silver, lead, wolfram, &c., are also found. Fish swarm in the rivers and in the coastal waters, and there is a huge population living in junks and sampans and supporting themselves by fishing. As regards the flora of China, it is tropical in the south, subtropical farther north, and still farther north prevail a number of plants and trees identical with or closely akin to those of middle Europe. The bamboo, on account of its extreme usefulness, is one of the most valuable trees. Fruits are abundant and varied. The soil, especially of the country comprising the two great river basins, is extremely fertile, and agriculture has always been important in China. The land is all freehold, held by families on the payment of an annual tax. Rice, as the principal food of the people, is the staple crop in the centre and south. The rich alluvial plains which cover a great part of the surface are admirably adapted for its culture, and by careful management yield amazing crops. In the north there is a variety called dry-soil rice, which is cultivated like any other cereal. Wheat, barley, and millet are the other chief grain crops. Three plants of the greatest economical importance to China are the mulberry, cultivated to provide food for silkworms, cotton, grown extensively in South Chihli and the Yangtze Valley and yielding annually about 8,000,000 piculs, and tea, grown in the west and south. In consequence of the anti-opium decree of 1906, the cultivation of the poppy has been rapidly restricted. Manual labour is still preferred to machinery in China, though there are now great cotton- and wool-mills and silk filatures in Canton, Shanghai, and elsewhere. In 1928 there were 120 cotton mills, numerous silk filatures and hosiery mills, and several woollen mills. There were also over 150 modern flour and rice mills, about 50 of which were in Manchuria. There are 400 glassworks, several cigarette factories, and numerous ship and engineering yards, especially at Shanghai. The Chinese still manufacture some beautiful porcelain, and their hand-turned brass-work is quite unique. They also excel in ivory and tortoise-shell work, in wood-carving, and in gold and silver

filigree work. Their hand-woven silks are of the finest quality. The inland trade of China, aided by its vast system of water communication, is of incalculable magnitude. Roads are numerous but bad, and railways have as yet a length of only 10,000 miles, of which about 2000 are in Manchuria, and 1300 were constructed by British capital. There is a good postal service. By the opening of the 'Treaty' ports and other ports (64 in number), the foreign commerce has been immensely increased. The chief of these ports are Shanghai, by far the first, Canton, Hankow, Swatow, Tientsin, Ningpo, Amoy, Newchwang, and Foochow. The main imports are cotton goods, metals and metal goods, and various manufactured articles. The main exports in 1928 were:

Commodity.	Value in £ Sterling.
Silk	28,165,000
Beancake	8,397,000
Beans	21,799,000
Oils	5,655,000
Cotton (raw) ..	5,124,000
Tea	5,570,000
Textiles	9,641,000

Among the countries trading with China, the principal are Great Britain, India, Russia, Japan, and the United States. The total exports in 1928 were valued at £144,831,000, and the imports at £174,624,000. The import of opium was 2527 lb. in 1922, as compared with 2,928,793 lb. in 1912. In 1928 China imported from Britain goods valued at £14,829,000, and exported to Britain goods valued at £12,218,000. Exports to and imports from Hong Kong were valued at £27,318,000 and £33,912,000. The principal exports to Britain are egg-yolk (£3,179,000 in 1928), silk (£422,015), and tea (£700,000). Among the standards of weight used are the *liang* or *tael* = 1½ oz. avoirdupois; the *catty* = 1½ lb.; and the *picul* = 133½ lb. There are no national gold or silver coins, and currency confusion is rife. The money unit is the hypothetical *Haikwan tael*, the value of which varies with that of silver, but is usually 3s. 9d. to 4s. The only universally accepted coin is the dollar Mex. (normal value, 2s. 4d.).

The Chinese belong to the great Mon-

golian race, but both physically and in temperament the natives of the central provinces differ greatly from their countrymen of the maritime provinces. The Chinese have many vices, and their commercial integrity is not unsullied, but one of the great characteristics of the race is an overwhelming sense of honour, which will not permit a Chinaman to go back on his word. They are a hard-working, uncomplaining, home-loving race. Filial piety is the principle on which Chinese society is constituted. Gambling is a universal vice, and opium-smoking (now repressed by law) is common.

The Chinese is the most important of the so-called monosyllabic languages of Eastern Asia, in which each word is uttered by a single movement of the organs of speech. There is no alphabet, each word being represented by a single symbol or character. In writing or printing, the characters are arranged in vertical columns, to be read from top to bottom. The arts of making paper and of printing from wooden blocks were invented in China hundreds of years before they were known in Europe. Chinese literature is now very extensive. The old system of a purely Chinese type of education was swept away by a decree of 1905, and numerous schools for teaching Western learning were established in almost every town and village. There are ten State and several private universities, and various technical and training schools. In 1923 there were 167,076 establishments with 5,814,000 scholars. A large number of young Chinese are studying in the United States, Europe, and Japan. There is a modern university with British professors at Hongkong. The chief religions in China are Confucianism (the religion of the learned), Taoism, and Buddhism, the last two of which are characterized by gorgeous ceremonial. Most Chinamen profess all three. Ancestor-worship is universal. In the western parts Mahomedanism has many followers, estimated at 10,000,000. The most important Christian missions are those of the French Roman Catholics, who have been longest in the country. Various Protestant bodies have carried on successful religious, educational, and medical missions since 1807. Jews have been settled in China since A.D. 69. In 1913 the Chinese Republic adopted the calendar of Western Europe.

The aboriginal hill-tribes are still nature worshippers. The government was for centuries an absolute despotism. A Republic, however, was established in 1912 on the abdication of the five-year-old emperor P'u-yi, dethroned by the Revolution of 1911-1912. According to the present Constitution, promulgated in 1923, the legislative power is vested in a Parliament consisting of a Senate and a House of Representatives. The President is assisted by a Cabinet, and there are many foreign advisers in various Government departments. The revolutionary Government established at Canton in 1921 by Sun Yat-Sen (q.v.) has considerable power. According to the Constitution, the organization of the army is based on a system of compulsory service. There are supposed to be 110 divisions with a peace establishment of 1,607,400. The air service has made little progress. There are numerous irregular forces controlled by independent *Tuchuns*. The navy, which consisted of a few vessels for coast and river service, was never efficient, and a mutiny in 1923 destroyed its value. All military and naval affairs have been weakened by civil wars and the continued opposition to the Central Government.

The history of China and of Chinese civilization goes back to the earliest times. The first ruler of importance was Chow-siang, who was the founder of the Tsin dynasty, from which China takes its name, and who died in 251 B.C. His great-grandson, a national hero of the Chinese, was the first to assume the title of 'Hoang' (emperor). He ruled over an empire nearly coterminous with modern China Proper. In his reign the Great Wall (see next article), designed as a protection against marauding Tatars, was begun in 214 B.C. In the thirteenth century the Mongols under Jenghis Khan and his son Ogdai conquered China, and in 1259 the celebrated Kublai Khan, a nephew of the latter, ascended the throne and founded the Mongol dynasty. The Ming dynasty succeeded in 1368 and a long period of peace ensued, broken about 1618, when the Manchus gained the ascendancy, establishing their capital in Peking, which was nearer their native country and resources than the old capital Nanking. The earliest authentic accounts of China published in Europe are those of Marco Polo, who visited the country in the thir-

teenth century. The first British intercourse was attempted under Queen Elizabeth in 1596, but no direct intercourse between the Governments took place till the embassy of Lord Macartney in 1792. In 1840 the British, on being refused redress for injuries, proceeded to hostilities, and a treaty was concluded (1842) by which the five ports of Canton, Amoy, Foo-chow-foo, Ningpo, and Shanghai were opened to British merchants, and the Island of Hong Kong ceded to the British in perpetuity. In 1850 the Tai-ping rebellion broke out in the provinces adjoining Canton, and was at length suppressed in 1865, largely by the exertions of Gordon, at that time a major. A war with Britain and France broke out in 1856, but after Peking was taken (1860) the Chinese Government granted a treaty securing important privileges to the Allies. In 1894 war broke out with Japan, and in this short struggle Japan had almost uninterrupted success both by sea and land, having driven the Chinese out of Korea. Peace was concluded in 1895, China agreeing to give up Formosa. In 1897 Germany seized the port of Kiaochow (Tsingtao), which was restored to China in 1922. In 1898 Russia obtained a lease of Port Arthur and Talienwan (both now Japanese); and in the same year Britain claimed and obtained a lease of Wei-hai-wei, which was returned to China in 1930. In 1900 an anti-foreign movement broke out in North China, mainly instigated by a secret society (the Boxers). Native Christians and European and other missionaries were murdered; and for a time the Europeans in Peking were in danger of being massacred. An international force, however, succeeded in effecting their rescue. In 1911 a revolution broke out which resulted in the establishment of a Republic in Feb., 1912. Canton declared its independence in 1921, and troubles broke out in consequence of the election of Sun Yat-Sen as President. Since then civil wars have been constant. At the end of 1925 the trouble became serious, and a great civil war between the Southern (Canton) and the Northern (Peking) forces began. Sun Yat-Sen died in 1925, and in 1926 his party, the Kuomintang (nationalist party) revived, and with Russian help proceeded against the Northern armies. The success of the nationalists was immediate, and in the

beginning of 1927 the Kuomintang moved its capital from Canton to Wuhan, the triple town at Hankow. Many nationalists, however, resented the Russian domination and communistic tendencies of their party, and in 1927, the moderates under Chiang K'ai-shek set up a Government in Nanking in opposition to the communist government in Wuhan. To protect British life and property Britain sent a large defence force to Shanghai in 1927. By the end of 1927 the Russian advisers were being driven from the country, and early in 1928 the nationalist party was united again and reorganized under moderate leaders, with head-quarters at Nanking. The advance against the Northern forces recommenced, and Peking was captured. Nanking became the capital of the Chinese republic, and Chiang K'ai-shek became president of the nationalist Government. Throughout 1929 and 1930 the nationalist government consolidated its position, received recognition as the central Government of China, and revised the treaty relations with foreign countries. It announced its intention of cancelling all extra-territorial rights. In 1931 and 1932 there was a dispute with Japan over rights in Manchuria, and in 1933 a serious Sino-Japanese war broke out, Japan having defied the League of Nations. See *Manchuria*; *Mongolia*; *Tibet*; &c.—**BIBLIOGRAPHY:** *The China Year Book*; J. Arnold, *Commercial Handbook of China*; R. K. Douglas, *China*; Sun Yat-Sen, *The International Development of China*.

China, Great Wall of, an artificial barrier extending for about 1500 miles in the north of China Proper. Its western end is in the deserts of Central Asia; its eastern reaches the sea N.E. of Peking. It was erected about 214 B.C., and is still intact for hundreds of miles.

China Rose, the name given to a number of varieties of garden rose chiefly derived from *Rosa indica* and *R. semper-florens*, both natives of China. Also a name sometimes given to *Hibiscus Rosa sinensis*, one of the mallow tribe, common in China and the East Indies.

Chincha Islands, a group of small granitic islands off the coast of Peru.

Chinchilla, a genus of South American herbivorous rodents, including a single species (*C. laniger*), which is a small squirrel-like form, native to the high Andes. Its fur is of great value. See p. 92.

Chinchilla (*Chinchilla laniger*)

Chinde, Portuguese town on E. African coast, on the only navigable mouth of the Zambesi, where the inland steamers meet the ocean steamers. Pop. 1690.

Chinese White, the white oxide of zinc. See *Paints and Pigments*.

Chingford, a municipal borough, England, Essex, near Epping Forest. Pop. (1931), 22,051.

Chingleput, a coast district, and its capital, India, Presidency of Madras. The district lies south of Arcot and Madras—area, about 3079 sq. miles. Pop. 1,406,000. The town has a pop. of 11,600.

Chiniot, a town of India, in the Punjab, near the Chenab. Pop. 13,475.

Chin-kiang, a city, China, province of Kiangsu, right bank of the Yangtze Kiang near its junction with the Imperial Canal; one of the treaty ports. Pop. 168,309.

Chinook Winds, warm winter winds from the Pacific in parts of the north-western United States and Western Canada. The name was given to these winds because they blew from the territory occupied by the Chinook Indians.

Chinsurah, a town in India, 20 miles north of Calcutta, on the Hooghly, closely adjoining the town of Hooghly, and now included in its municipality. It is a military station.

Chin-Wang-Tao, a treaty port, China, province of Chihli. It has a large trade, as the estuary bars at Taku and Newchang make transshipment and delay necessary

at these ports. All the North China trade passes through Chin-Wang-Tao in winter. The harbour is well protected and has a mud bottom (depth of entrance, 25 feet; depth at quays, 22-29 feet). There is direct rail communication with Peking, Tientsin, Moukden, &c., and there are all facilities for repairing, storing, and bunkering.

Chioggia, a seaport-town of Italy, on one of the lagoon islands of the Adriatic, 15 miles from Venice. Pop. 35,052.

Chios, an island belonging to Greece, in the Aegean Sea, separated from the coast of Asia Minor by a channel not more than 5 miles wide where narrowest, and about 53 miles west of Smyrna. It is 32 miles long with a mean breadth of about 12 miles; area, between three and four hundred square miles. The surface exhibits a number of limestone ridges, separated from each other by verdant and fertile valleys, and reaching a height of 4000 feet. There are no perennial streams; but an abundant supply of water is obtained from wells. The principal products are wine, oil, cotton, silk, oranges and other fruits, leather, antimony, zinc, marble, and mastic. Very little grain is produced. Pop. (of whom a large portion are Turks) (1928), 75,680. The capital is Chios or Castro (pop. in 1928, 22,122).

Chippendale, Thomas (d. 1779), English cabinet-maker. He published in 1754 the first edition of a book containing designs for furniture (*The Gentleman and Cabinet Maker's Director*). His style was based on that of France, and was more florid than that of his successors, Hepplewhite and Sheraton. See *Furniture*.

Chippenharn, a borough of England, Wiltshire, on the Avon, with a large cheese market. Pop. (1931), 8,493.

Chippewayans. See *Indians, American*.

Chippeways. See *Indians, American*.

Chiquimula, a department of the Central American state of Guatemala. Area, 4000 sq. miles; pop. about 65,000.

Chiquitos, an Indian people of Bolivia, about the headwaters of the Madeira and Paraguay. They number about 22,000.

Chiriqui, an administrative district in the state of Panama. It is naturally very fertile, and has good harbours both on the Caribbean and Pacific coasts. Pop. 68,484.

Chiron, the most famous of the Centaurs, a race fabled as half men half horses. He was celebrated for his wisdom,

and the greatest heroes of the time—Dionysus, Jason, Hercules, Achilles, &c.—were represented as his pupils.

Chiru (*Pantholops Hodgsoni*), a fine large species of the antelope found in Tibet, somewhat larger than the chamois. The Tibetans ascribe special virtues to its blood, and use the rings on its horns for fortune-telling.

Chisinau, Romanian name of *Kishinev* (q.v.).

Chislehurst, an urban district of England, in Kent. Pop. (1931), 9876.

Chiswick, London suburb, county of Middlesex, now joined with Brentford (q.v.) to form an urban district. There are many fine villas in the neighbourhood.

Chitin, a sort of transparent horny substance, the chief tissue-forming ingredient of the wing-cases of insects, and the shells of crabs and other crustaceans. It is very resistant to chemical agents, but may be dissolved in strong mineral acids.

Chitons. See *Gasteropods*.

Chitral, a small native state in the extreme north of India, intersected by the Chitral River, a tributary of the Kabul.

Chittagong, a district of India, in Eastern Bengal, having the Bay of Bengal on the west; area, 2563 sq. miles; pop. 1,508,433. The level lands, chiefly on the coast and in the valleys, are very fertile. Chittagong is also the name of a commissionership. Area, 11,772 sq. miles; pop. about 5,000,000.

Chittagong, the chief port of Eastern Bengal, on the Karnaphuli about 12 miles from its mouth. Though very unhealthy, its trade has of late been steadily increasing, the chief export being tea. Ships of 6000 tons can ascend to the town. Pop. 28,766.

Chittoor, a town of India, capital of the North Arcot District, Madras Presidency. Pop. 15,108.

Chiusi, one of the twelve cities of the Etruscan Confederation; a town of Italy, province of Sienna. It has rich collections of Etruscan and Roman antiquities. Pop. 6000.

Chivalry, the organization of knight-hood as it existed in the Middle Ages. It is an institution which took organic shape in the twelfth century, reached its maturity in the fourteenth, and lingered in a state of decay until the end of the sixteenth century. As a system it was,

above all, feudal and tenorial. The chief characteristics of the chivalric ages were a warlike spirit, a lofty devotion to women, a love of adventure, and an indefinable thirst for glory. The education of a knight in the days of chivalry was as follows: In his twelfth year he was sent as a page to the court of some baron or noble knight, where he spent his time chiefly in attending on the ladies, and acquiring skill in the use of arms and in riding. When the page ceased to be a boy, he became an *esquire* or *squire* (shield-bearer). The third and highest rank of chivalry was that of knighthood, which was not conferred before the twenty-first year, except in the case of distinguished birth or great achievements.—**BIBLIOGRAPHY**: Sir Walter Scott, *Essay on Chivalry*; F. W. Cornish, *Chivalry*; W. H. Schofield, *Chivalry in English Literature*.

Chivasso, a town of Italy, 14 miles north-east of Turin. Agriculture and the manufacture of silk are the principal occupations. Pop. 10,084.

Chive, or **Cive**, a small perennial garden plant (*Allium Schænoprasum*) of the same genus as the leek and onion, and used for flavouring soups. It is seldom found wild in Britain, where it is often cultivated as an edging for garden plots.

Chivilcoy, a town of Argentina, 99 miles west of Buenos Aires, with distilleries and ironworks. Pop. 23,241.

Chloral, or **Trichloraldehyde** ($\text{CCl}_3\cdot\text{CHO}$), a liquid first prepared by Liebig by passing dry chlorine gas through absolute alcohol to saturation, and still prepared in a similar manner. When mixed with water, it readily yields *hydrate of chloral*, a white crystalline substance which, in contact with alkalies, yields chloroform and formic acid. Chloral is a well-known hypnotic inducing when administered in small doses a condition closely resembling natural sleep, and is especially useful in certain nervous affections. It is used as an antidote in cases of strychnine poisoning, and is a powerful deodorizing antiseptic. On account of its depressant heart action, it has to be administered with considerable care and only under medical advice.

Chlorates, salts of chloric acid. The chlorates are analogous to the nitrates. They are decomposed by a red heat, nearly all of them being converted into metallic chlorides, with evolution of pure

oxygen. *Potassium chlorate* is used in medicine (1 in 40) as a mouth-wash and in throat affections. Large doses are poisonous. It is also used in the manufacture of matches.

Chlorine (symbol, Cl; atomic weight, 35.46), a gaseous element, discovered by Scheele in 1774, which does not occur free in nature, but combined with metals is widely distributed as chlorides. United with sodium it forms sodium chloride (NaCl) or common salt. Chlorine is produced in quantity during the electrolytic preparation of sodium and caustic soda from sodium chloride. It is a non-combustible, heavy gas, two and a half times heavier than air; it has a sharp, suffocating odour, attacks the mucous membranes strongly, and if inhaled for any length of time causes death. Chemically it is a very active substance, and unites with many elements at ordinary temperatures. Chlorine is a powerful bleaching-agent and disinfectant, owing to its great affinity for hydrogen. If moist chlorine be brought in contact with colouring-matters such as litmus, indigo, or dyes such as turkey red, the colour is immediately discharged. The substance is used largely for bleaching and disinfectant purposes, either as chlorine or combined as bleaching-powder or hypochlorites. It is used in the preparation of carbon tetrachloride and chloroform. Almost all the chlorine of commerce is prepared electrolytically, and sent on the market, in iron cylinders, either compressed or liquefied.

Chlorite, a name for a group of minerals, such as pennine, clinocllore, &c., resembling green micas, but without elasticity in their cleavage-plates. Chlorites are magnesium iron aluminium silicates, combined with water rising to as much as 13 per cent. They are softer than mica, being easily scratched by the thumb-nail.

Chloroform, CHCl_3 , a volatile, colourless liquid with a sweet, nauseating taste and smell, prepared from bleaching-powder and diluted alcohol. It was discovered in 1832, but only became well known after 1847, when it was introduced as an anæsthetic by Sir J. Y. Simpson. See *Anæsthetics*.

Chlorophyll, the principal pigment of green chromatophores or *chloroplasts*. Extracted from leaves by alcohol, it forms a deep-green solution, with blood-red fluorescence and several strong absorp-

tion bands in the red and orange part of the spectrum. Its function in the chloroplast is to absorb these rays from sunlight, and to transform their radiant energy into chemical energy used in the process of carbon assimilation. Chemically, it is a complex substance, allied to the red blood-pigment hæmoglobin, and consists of carbon, hydrogen, oxygen, nitrogen, phosphorus, and magnesium.

Chloroplast, in green plants, a specialized particle of protoplasm containing the green pigment (chlorophyll) which enables the energy of sunlight to be used in building up organic substances from water and carbon dioxide.

Chlorosis, or **Green Sickness**, an anæmia which is characterized by a marked loss of colour in the red blood corpuscles. It is usually seen in under-fed, overworked town girls between the ages of fourteen and seventeen, and is due to lack of fresh air and exercise, with improper feeding. The chief symptoms are the yellowish-green colour of the skin, gastro-intestinal and nervous disturbances, palpitation, general pallor, and often swelling of the feet. The essential part of any treatment is the administration of iron, along with laxative medicines.

Choate, Joseph H. (1832-1917), American lawyer and diplomat. He conducted many celebrated cases in state courts and international tribunals, representing the Canadian Government in the Behring Sea dispute. From 1899 to 1905 he was Ambassador in London. He was famous as an orator and a humorous after-dinner speaker.

Choco, an intendency of Colombia; area, 68,127 sq. miles; pop. 91,386. It is a very rich mineral region. The chief town is Quibdo.

Chocolate. See *Cocoa*.

Choctaws. See *Indians, American*.

Choiseul, Étienne François, Duc de (1719-1785), French statesman. After having been Ambassador at Rome and at Vienna, he became in reality Prime Minister of France. His fall was brought about in 1770 by Madame du Barry, the new favourite of the king.

Choisy-le-roi, a town, France, 7 miles south of Paris, on the Seine. Pop. 15,900.

Choking Coil. See *Impedance Coil*.

Cholera, a disease sometimes called *Asiatic Cholera* on account of its presence from early times in India and the East.

It is only within the last century that the disease has been found in Europe and America. In 1832 both Britain and North America suffered from a severe epidemic, and in 1854 and 1866-1867 the disease again broke out, though not to such a severe degree. Except for a few odd cases brought in by ships, it has never gained a foothold in Britain since 1873, though the south of Europe and Russia have suffered in the present century. During the European War (1914-1918) cholera broke out in Germany and Austria, and also during the campaigns in Mesopotamia and Gallipoli.

Cholera is caused by a comma-shaped bacillus discovered by Koch in 1884. The disease is not highly contagious, but those in contact with the clothing of the patient are very liable to be infected. Infection itself is usually conveyed by water, milk, or vegetables washed in infected water. The virulence of an epidemic is in direct proportion to the contamination of the water-supply. Cholera 'carriers' undoubtedly help to spread the disease, especially if they are persons who have to do with the preparation of food. The infection is not borne by atmosphere. There are three stages in the course of an attack. (1) *Preliminary*.—Diarrhœa (associated with colicky pains and cramps), headache, depression, and perhaps vomiting are present. (2) *Collapse*.—In this stage there are marked increase of diarrhœa, griping pains, intense thirst, extreme exhaustion, and the patient rapidly passes into a state of severe collapse. In the majority of cases the patient soon becomes comatose and dies. (3) *Reaction*.—If the patient survives, reaction takes place quickly. The chief complications that may arise are pneumonia, pleurisy, and nephritis. The more rapid the onset of symptoms, the more deadly the result. The mortality is very high, 50 to 80 per cent in epidemics.

Cholera sicca is the name given to the very severe type, where death takes place within a few hours after onset. *Cholera infantium* is a term applied to a very severe form of gastro-enteritis in infants. It is characterized by many symptoms similar to those of cholera, and there is marked prostration with a high death-rate.

Treatment.—Serum is used with considerable success as a preventive measure

during epidemics, or as a precaution in districts where cholera is endemic. Warmth, rest, and stimulation by ether or strychnine must be given during collapse, while intravenous injection of saline solution is found to be of value. Hot applications to the abdomen and morphia injections may be given to relieve the pain.

Cholet, a town of North-West France, department of Maine-et-Loire, with manufactures of cotton goods and woollen stuffs, and a brisk trade. Pop. 21,058.

Cholon, a town of French Cochinchina, 4 miles from Saigon. Pop. 168,000.

Cholula, a town of Mexico, 60 miles south-east by east of Mexico, formerly a large city, the seat of the Aztec religion of the ancient Mexicans, with more than 400 temples. Pop. about 9000.

Choluteca, a mining town of Honduras, Central America. Pop. 8065.

Chomutov, a town, Bohemia, Czechoslovakia, formerly known as Komotau. The industries include brewing, weaving, and dyeing. Pop. 21,123.

Chonos Archipelago, a group of islands lying off the west coast of Patagonia. Two are large, but they are all barren and scantily inhabited.

Chopin, Frédéric François (1810-1849), Polish pianist and musical composer. He went to Paris in 1831 on account of the political troubles of Poland, and became intimate with George Sand, to whom Liszt had introduced him, but broke with her in 1846 after the publication of her novel *Lucretia Floriani*. He wrote numerous pieces for the pianoforte, chiefly in the form of nocturnes, polonaises, waltzes, and mazurkas, all of which display much poetic fancy, abounding in subtle ideas with graceful harmonic effects.—Cf. Sir W. H. Hadow, *Studies in Modern Music*.

Chorley, a municipal borough, England, Lancashire, 20 miles N.W. of Manchester, with manufactures of cotton goods, calico-printing and dye-wood works, floor-cloth works, and iron-foundries. In the vicinity are coal-, lead-, and iron-mines. Pop. (1931), 30,795.

Chorum, town and vilayet of Asia Minor. The town is situated 100 miles north-east of Angora, has tanneries and potteries, and is of great commercial importance, being on the trade route to Samsun on the Black Sea. Pop. (town), 13,000; (vilayet), 233,613.

Chorus, in ancient Greece, a troop of

singers and dancers, intended to heighten the pomp and solemnity of festivals. In the choric songs sung in honour of Dionysus the ancient Greek drama had its birth. During the most flourishing period of ancient tragedy (500–400 B.C.) the Greek chorus was a troop of men or women, who, during the whole representation, were spectators of the action, never quitting the stage. In the intervals of the action the chorus chanted songs which related to the subject of the performance. Originally it consisted of a great number of persons, sometimes as many as fifty; but the number was afterwards limited to fifteen. As a factor in drama the chorus has survived in various imitations or revivals of the ancient Greek theatre, such as *Samson Agonistes*.

Chose, in law, property; a right to possession; or that which may be demanded and recovered by suit or action at law. Thus, money due on a bond or recompense for damage done is a *chose in action*; the former proceeding from an *express*, the latter from an *implied* contract. A *chose local* is annexed to a place, as a mill or the like; a *chose transitory* is a thing which is movable.

Chosen, the Japanese name for Korea (q.v.).

Chosroes I, the greatest of the Sassanid kings of Persia, reigned A.D. 531–579. He was at war with Justinian for twenty years, until 562, when the emperor again purchased peace by an annual tribute of 30,000 pieces of gold. The peace continued for ten years, when the war was renewed with Justin, the successor of Justinian, when Chosroes was again successful. The succeeding emperor, Tiberius, at length completely defeated the Persians in 578.

Chota Nagpur, a division of British India, in Bihar and Orissa, Presidency of Bengal. It possesses great mineral resources and is very mountainous. Total area, 27,065 sq. miles; pop. 5,653,028.

Chouans, the Royalist peasantry of Brittany and Lower Maine, who carried on a petty warfare against the Republican Government from an early period of the French Revolution. The first chief of the Chouans was Jean Cottereau, who with his three brothers organized these bands in 1792. He was killed in an engagement with the Republican troops in 1794. The Chouans were not suppressed till 1799.

Chough, Cornish Chough, or Red-

legged Crow, a bird belonging to the genus *Fregilus*, of the crow family, but nearly allied to the starlings. *Fregilus* or *Pyrrhocorax graculus* is the only British or European species, and frequents, in England, chiefly the coasts of Cornwall. Its general colour is black, contrasting well with the vermilion-red of the beak, legs, and toes. Other species are native to the Alps and Himalayas.

Chrétien (or Crestien) de Troyes (c. 1150–c. 1200), French trouvère. His fame rests upon six romances still extant, viz. *Erec et Enide*; *Perceval le Gallois*; *Le Chevalier au Lion*; *Cligès*, *Chevalier de la Table ronde*; *Lancelot du Lac*, or *de la Charette*; and *Guillaume d'Angleterre*.

Christadelphians, a religious body which originated about the middle of last century. The founder was John Thomas (1805–1871). They believe that God will raise all who love Him to an endless life in this world, but that those who do not shall absolutely perish in death.

Christchurch, a municipal borough, England, county of Hampshire, situated at the confluence of the Avon and Stour, 1 mile from the sea. Pop. (1931), 9183.

Christchurch, a city of New Zealand, capital of the province of Canterbury, is situated on the Avon River 7 miles from Port Lyttelton, with which it has railway communication. It contains a number of handsome buildings. The industries are mainly connected with the freezing and export of mutton. Pop. of the city and its extensive suburbs (1926), 122,000.

Christian II (1480–1559), King of Denmark, Norway, and Sweden. He succeeded his father as King of Denmark and Norway in 1513, and in 1518 usurped the throne of Sweden, from which he was expelled by Gustavus Vasa in 1522.

Christian IV (1577–1648), King of Denmark, succeeded to the throne as a minor in 1588. In the Thirty Years' War he was beaten by Tilly at Lutter in 1626, but afterwards, in conjunction with Gustavus Adolphus, was able to conclude an honourable peace at Lübeck, 1629.

Christian X (1870–), King of Denmark, son of King Frederick VIII. He succeeded to the throne of Denmark on 14th May, 1912.

Christian Era, the great era now almost universally employed in Christian countries

for the computation of time. The date of the birth of Christ, from which its beginning is reckoned, is now thought to have been between 6 and 4 B.C. It was first used by Dionysius, a Syrian monk, in the sixth century, but did not become general until about the middle of the fifteenth century.

Christiania. See *Oslo*.

Christianity. It was in the province of Judæa that Christianity arose. The new religion began in a revival movement within Judaism, headed by a prophet, John, who had his converts immersed in the Jordan, and was therefore called 'the baptist, or baptizer'. The movement spread. John was presently arrested and put to death by the Jewish kinglet Herod (not by the Romans). But a young devout Galilean called Jesus, whom he had baptized, began a fresh movement in Galilee as well as in Judæa, announcing, like John, the immediate advent of the kingdom of God, but interpreting it with a wealth of moral and spiritual ideas which struck far more directly than did John at the conventional religion of the authorities. He gathered round him a band of devoted adherents, especially an inner circle of twelve who acted as his delegates and were trained by him to preach the good news and to exorcise evil spirits. The authorities were alarmed by the trenchant criticism passed by Jesus upon the orthodox Judaism of the day. Their interference led to a withdrawal of Jesus from the scenes of his early popularity in Galilee. He then spoke openly but privately to the twelve of his vocation as God's Son, the long-promised Messiah who was to introduce the new kingdom by suffering upon the cross. Finally he went to Jerusalem, accompanied by his followers, proclaimed himself as Messiah, was betrayed by one of his inner circle, and put to death by the Roman governor, at the instigation of the priests, upon a charge of sedition and blasphemy. This was on a Friday, about the year A.D. 30. The following Sunday his grave was found empty. His disciples declared that he had risen from the dead, as he predicted. They organized themselves eventually into a devout community within Judaism, which called itself the Church. Their watchword was 'Jesus is the Christ (or Messiah)'.

For a time all the followers of Jesus

were Jews. Presently one of them, Stephen, spoke out with prophetic directness upon the crime committed by the Jews in murdering Jesus, and predicted, on the lines of Jesus, the approaching supersession of the Jewish cultus by God. For this Stephen was martyred. The implications of Christianity were forced upon the minds of the Church as well as upon the authorities. But it was a new convert, a brilliant young leader of the Pharisees, who first opened up the path for the new religion, by advocating the appeal of Christianity to non-Jews as well as to Jews. Paul was not the first to preach the gospel outside the limits of Judaism, but he was the first to expound and develop the movement from the headquarters of the Church at Antioch. This led to a crisis within the Church at Jerusalem, where the apostles and first nucleus of the Christians tended to cling to the narrower conception of the mission of the new religion. Eventually an understanding was reached, by which the right of non-Jews to become Christians without being circumcised and without having to keep the Jewish law was recognized. Paul and some other missionaries carried the gospel far and wide over the Mediterranean world. By the time that Paul was arrested by the Jews in Jerusalem, and put to death at Rome by the Roman authorities (about A.D. 65), Christianity had been planted in the empire from Syria in the east to Rome, possibly to Egypt and Spain in the west; groups of Christians existed in Macedonia and Greece as well as in Asia Minor, and the rest of the primitive apostles had scattered over the world in various directions. The only ones of whom authentic tradition has preserved any trace are Peter and John, the work of the former being connected with Corinth and Rome, the latter being connected with Asia Minor, where Ephesus formed the next centre of the new religion. Jerusalem had fallen, in A.D. 70, during the Jewish revolt, and with Jerusalem the old centre of Christianity. Henceforth the fortunes of the new faith were to lie along the lines marked out by the course of the early missions in the outside world which had Rome as its centre.

The Romans were not a persecuting people, but Christianity was persecuted because it was not an accredited or licensed religion, as every religion had to be. It

was not a national religion. It seemed to the suspicious Romans a vast secret society, meeting for purposes of sedition, without any visible signs of religion such as altars, temples, or priests. The Romans had a just fear of secret societies at this period. Besides—and this was the supreme charge—Christians would not call Cæsar 'lord', and this worship of the emperor was, especially in the East, the recognized badge of patriotism. On this issue the early persecutions turned. In the middle of the third century, after a long interval of peace, Decius the emperor enforced the law with special vigour, and half a century later Diocletian made persecution of Christians one of his political reforms. But this was the last effort of the pagan State. Constantine, with political foresight, saw that the stability of the empire required the toleration of this Church. As he rose to power he identified himself with the new religion, and, after proclaiming toleration for all religions by the Edict of Milan in 313, went on to adopt Christianity as the official religion of the empire. This meant the end of the long struggle.

The heroic fidelity of the martyrs had led to this wonderful reversal of the traditional Roman policy, but it had been allied to the work of the apologists during the second and third centuries. The apologists were, however, simply one branch of the growing Church, which, confronted by movements like gnosticism (q.v.), threw up three barriers behind which their own life thrived: (a) the apostolic clergy, deriving their authority from the primitive apostles; (b) the apostles' creed; and (c) the canon of the New Testament. Thence arose dogma, polity, and a discipline of life and worship, which proceeded to alter the eucharist into a sacrifice, analogous to those of pagan religions, and requiring a valid body of priests in the shape of the clergy to administer it. Under Cyprian the later transformation of the clergy into a hierarchy was promoted in North Africa. Alexandria and Asia Minor shared in the dogmatic development, while Rome's Church was becoming, owing to its hereditary connection with St. Peter and St. Paul, as well as to the prestige of the capital, increasingly prominent in the Western Church. But there were five patriarchs, at Constantinople, Jerusalem, Alexandria, Antioch, and Rome, each as

yet equal to the others in authority. One of the issues of the next period was which of the five was to be supreme. This period ends in the ninth century, when the Holy Roman Empire comes into being. The dominant factor during this age is the transference of the centre of gravity from the Mediterranean basin to Western Europe. This involved the separation of the Eastern and Western Churches, owing to political as well as to religious reasons. Furthermore, it meant the rise of the Roman Church and bishop to a commanding place in Western Christianity. During the interval between the fourth and the ninth centuries the Eastern and the Western Churches had begun to fall apart. This was in the main due to Constantine's policy of founding a new capital for the empire at Constantinople or Byzantium. It was not the controversies and councils upon the person of Christ and the Trinity, which raged from the fourth century to the eighth, that really separated the two Churches, although the difference of temperament between the two Churches was accentuated finally by the emergence of a minor doctrinal issue. Western theologians began to assert that the Holy Spirit proceeded from the Son as well as from the Father, which the Eastern Church declined to admit. This contention, in the form of the famous *filioque* clause, was destined to drive a wedge between the two Churches. But the division was rendered possible by local considerations as well. The Byzantine Church, under the sway of a resident emperor, had not the freedom of development which the Western Church enjoyed, and was able to use, thanks to its more practical genius. Moreover, after the rise of Islam, the Byzantine Church bore the brunt of the Mahomedan attack.

The difference between the two Churches may be illustrated by their respective use of monasticism, which rose in the fourth century as a protest against the world in the Church no less than against the world itself. As time went on, it remained for the most part a recluse movement in the East. But in the West this holiness movement showed itself capable of growth. The Roman instinct for organization, inherited by the Western Church, turned monasticism into a pioneering force, as Gaul and Germany opened up. The descent of these nations upon Italy was

the beginning of a new age. The Goths swarmed into the East also, under Alaric, but their chosen prey was the West. Invasion followed invasion. In 476 the line of Roman emperors in the West ended, after which dynasties of Franks and Lombards ruled Italy till Charlemagne rose upon both to inaugurate afresh the Roman Empire in the West, side by side with the Italian Pope, whose co-operation with Charlemagne entitled the new power to be called the Holy Roman Empire. When Leo formally crowned Charlemagne at Rome, he represented the popular will, but his action indicated the authority and prestige which the Church had gradually but steadily gained during the past three centuries. For the invaders had been awed, ordered, and evangelized upon the whole by the Church. Besides, the propaganda of missions was carrying the gospel up into Europe. The missionaries, largely recruited from the ranks of the monks, pushed their way through Gaul into the far north. Celtic monasticism, especially from Ireland, played a leading rôle in the advance, in Scotland, for example, and later in Germany. English Christianity received a fresh and lasting impulse from the mission of Augustine towards the end of the sixth century, and this in turn flowed over into the Netherlands.

By the eighth century the needs of Church and empire alike pointed to an alliance. The Church required the support of the empire for its work, the co-operation of the State for the task of welding a number of national Churches into a single organization. And the stability of the empire was felt to rest upon the authority of the Roman bishop, if anarchy was to be avoided. The Papacy thus gradually became the central and supreme court of decision in ecclesiastical matters throughout the West. Its jurisdiction came to cover not only administrative but legislative authority, however, and this precipitated the conflict with the secular authorities which passed through various phases from the ninth to the sixteenth centuries. The fortunes of war swayed sometimes in favour of the Pope, sometimes in favour of the emperor. In the twelfth century Hildebrand seemed to have won the day for the Papacy, but in the fourteenth century the rising national power of France proved too much

for the triumphant Papal absolutism. What the German dynasties had failed to effect was managed by France. The mediæval period may be said to end with the beginning of the fourteenth century. Then follow the changes that herald the Reformation of the Church, the decay of the Papal authority during the residence of the Popes at Avignon, the scandal of rival Popes excommunicating each other, and the refusal of the Papacy to reform itself in face of demands from Christendom.

The explosion which rent asunder the Roman Catholic Church came in the sixteenth century. The spark that lit the fire was the spirited protest of Luther, a German monk, against a shameless advocacy of indulgences by the Papal agent in Germany. This was in 1517. The history of the four centuries since then has been for Christianity the development of the issues raised so abruptly in that year. They were wider than Luther or anyone else foresaw at the time. The forces and ideas of the new age all came into play, once the struggle began, and what seemed at first to be simply another local protest against Papal policy developed into what is known as the Reformation. The name is significant. The reformers aimed at 're-forming' not at destroying the Church. When the Papal leaders refused to initiate reforms or to carry out those now demanded in practice and doctrine, the reformers set themselves to 're-form' the Catholic Church in accordance with the Word of God, believing that they were carrying on the true tradition of the Church, restoring the divine, apostolic ideal which had been corrupted by the mediæval Papacy, and convinced, as they broke the external unity of the Western Church, that they were upholding the only true unity of Christians, which was not bound up with any external organization but with faith and love. For the next two centuries Western Christianity exhibits the spectacle of reformation and counter-reformation, the Reformed Churches finding their feet, struggling often with one another as much as with Rome, and Rome endeavouring to regain lost ground. As the Reformation took shape, it was realized that the fundamental principle was not the right of individual judgment but the right of the Christian to come into direct touch

with God—in other words, the priesthood of all believers, a privilege which, according to the reformers, had been denied by the Mediæval Church when it interposed its own tradition between God's word and the soul, and made pardon dependent upon absolution from a priest. This position led to a more or less thorough break with the entire sacramental and hierarchical system of the Mediæval Church. But there was no agreement upon details, and often serious diversity of opinion upon the extent to which Christians were justified in retaining any materials of the mediæval structure. The Roman Church settled its house more rapidly and effectively. The reactionary party triumphed at the Council of Trent, mainly owing to the policy of the Jesuits (q.v.). The Council of Trent (1545-1563) succeeded in consolidating the Roman forces, in organizing a powerful current of opinion against the reformers, and in confirming the Papal supremacy. Some of the most glaring abuses were dealt with; the clergy were summoned to fresh zeal; and the polemical, positive statement of the Roman doctrine was elaborated with subtlety and precision. No party contributed more to this result than the Jesuits, but the counter-reformation relied upon other forces as well, principally upon the power of Spain. Through the subservience of Spain the Roman Church not only succeeded in imposing absolute authority upon its European subjects, and in changing Romanism from a European to a Latin form, but in attacking politically the champions of the reformed faith. The struggle ended in the overthrow of Spain, which was first checked in the Netherlands and then worsted in the fight with England. By the sixteenth century the counter-reformation had reached its height, and the political fortunes of the respective Churches in Europe were substantially settled.

The vital connexion of the Papal religion with the entire fabric of social and political life made any religious change the source of far-reaching unrest and unsettlement. It was inevitable that the fresh interpretation of the faith which the reformed Churches undertook should involve not merely a variety of ecclesiastical forms, each claiming to supersede the mediæval type by a purer, but numerous civil experiments, the nature and

success of which depended largely upon the characteristics of the various nations in Europe. In Germany, for example, the reforming movement was driven by its own impetus to challenge the entire Papal system, and, in reliance upon local rulers, to develop in Lutheranism a form which doctrinally differed from Swiss and Calvinistic religion, especially in relation to the conceptions of the Church and of the eucharist, while it involved a close tie between the civil polity and the Church. This particular expression of the reformed faith did not extend beyond Germany, however, except to Scandinavia, where the Reformation was introduced mainly on account of political considerations. In Calvinism, which spread from France to Switzerland, the form taken was less dependent upon the State, more republican, and therefore more aggressive. Calvin's restatement of Christianity raised a Church more consolidated than elsewhere. Its practical embodiment at Geneva inspired the reformers in Europe with energy to meet the counter-reformation. "Calvinism saved Europe," says Mark Pattison. It breathed vigour and definite conviction into the Netherlands and Scotland, as well as into France, and enabled the new faith to consolidate itself effectively against persecution and opposition. In France the Reformation passed from an initial humanist and mystical movement into a popular break with the Roman Church, which became involved with national issues, and eventually, after the prolonged wars of religion, ended in the ejection of the Huguenots during the seventeenth century—a policy for which France suffered politically and socially. The Reformation did not suffer here so fatally from the Inquisition as in Spain, but it ceased to hold the nation, and Protestants became no more than a tolerated minority. The Netherlands, on the other hand, vindicated their independence against Spain. Scotland, swept by a popular rising, broke the Roman power, organized itself on Calvinistic lines under Knox, and thereafter found its internal problems in the struggle with England. England, again, had been carried into the struggle by the popular resentment of Papal interference, which Henry VIII adroitly turned to his own ends. Here, more than anywhere else, the doctrinal rupture with the mediæval

system was tentative. The controlling motive, even under Elizabeth, was political, a suspicion of Roman intrigues against the throne and the liberties of the realm. Eventually the Church settled down upon a constitution which was mediating, but extremer views struggled for expression. Continental influences fostered Puritanism, and the result was a cleavage within the national religion, heightened by factors drawn from the Scottish situation. One channel for this tide of piety was opened by the conquests of England in America, which during the seventeenth century enabled the Puritans to colonize at peace beyond the bounds of England, a privilege denied to the French Huguenots, who were strictly forbidden to enter the French possessions in Canada.

During this period the need of systematizing the new doctrine led to what may be called reformed scholasticism, which differed from mediæval scholasticism in abjuring Aristotle, in being heterogeneous and sectarian, and in concentrating upon doctrines like the atonement, the person of Christ, and predestination. From the seventeenth century onwards the fortunes of Christianity in the Reformed Churches of Europe are dominated by the activity of historical criticism and philosophical speculation, both of which contained rich materials for an advance in faith and practice, although they were exaggerated and suspected at first. The crucial question was no longer creeds but the vital principles of Christianity, the relations between religion on the one hand and philosophy and history upon the other. Fundamental issues were raised, as they had been in the age of mediæval scholasticism, only upon the new ground of criticism. This involved the whole problem of authority in the Church, with its corollaries of the inspiration of the Bible and the relation between Church and State. Nor was the period absorbed in doctrinal issues. From time to time the vital, pulsing life of the Reformed Churches threw up movements of practical religion, revivals like those of the Moravians, of Wesley and Whitefield, and even within the Roman Church, which suffered less from doctrinal disputes, a series of convulsive struggles like those connected with the names of Molinos and Jansen, especially in the French Church. Since

then the characteristics of the Roman Church have been, in the main, the gradual increase of the Papal authority, marked by the declaration in 1870 of the Pope's infallibility, the reaction, as gradual but as definite, against speculation, which has set in during the inhibition of modernism, and the reassertion of the Thomist or mediæval basis of doctrine. These, together with real revivals of piety, have increased the attractive power of the Roman Christianity both at home and abroad, especially as they have been accompanied by educational propaganda and heroic missionary enterprise. But, apart from special Church politics, the outstanding features of Christianity during the modern period, i.e. during the years since the opening of the nineteenth century, are too broad to be identified rigidly with the story of any one Church.

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Christian Knowledge, Society for Promoting (S.P.C.K.), a society founded in London in 1698, in connexion with the Church of England, having for its main objects the establishment of churches, schools, and libraries, and the publication and circulation of religious and moral literature.

Christiansand, a seaport in the south of Norway, with manufactures of tobacco and machinery, brewing, &c., and a considerable export of timber and fish. Ships of any size can be accommodated at the quays. Christiansand is a modern bunkering station, and is open all the year round. Pop. 16,605.

Christian Science, a view or theory regarding, and method of dealing with, human ailments or diseases and their cure, owing its origin to an American, Mrs. Mary Eddy (q.v.), who arrived at her discovery of the science of mind-healing about 1866. The main religious doctrines of Christian Scientists are those of Christians in general; among their special beliefs are that nothing is real but mind; that matter only seems to exist; and that the impres-

sions given by our so-called senses are not real, but exist only in our thoughts, are only 'mortal beliefs', so that disease and pain are mental delusions, without reality, and would have no existence if one had a true knowledge of 'immortal truths' and of God. Christian Science demands the entire surrender of the human will to God. There are a number of Christian Scientists specially appointed to practise the mind-cure, whose method, partly at least, consists in prayer.—BIBLIOGRAPHY: M. B. Eddy, *Science and Health, with Key to the Scriptures*; E. E. Weaver, *Mind and Health*; H. A. L. Fisher, *Our New Religion*.

Christians-öe, a group of three small islands in the Baltic, belonging to Denmark, named from the chief island, which has a harbour of refuge and a lighthouse.

Christianstad, a town, Sweden, on a peninsula in the Helge Lake, about 10 miles from the Baltic, with distilleries, breweries, and manufactures of gloves, linen and woollen fabrics, and some trade through the port of Åhus, at the mouth of the Helge. It is an important railway junction. Pop. 13,094.

Christiansted, a fortified town, capital of the Island of Santa Cruz (Virgin Islands), which belonged to Denmark until 1916, when it was sold to the United States. It has a good harbour and some trade. Pop. 4574.

Christiansund, a seaport town on the north-west coast of Norway, on three islands which enclose its beautiful land-locked harbour. It carries on a trade in dried and salted fish. There is secure accommodation for ships of any size. Pop. 15,198.

Christina (1626–1689), Queen of Sweden, daughter of Gustavus Adolphus. She came to the throne at the age of six, had a man's education rather than a woman's, and began to govern at the age of eighteen. A great talent for business, and great firmness of purpose, distinguished her first steps. She terminated the war with Denmark begun in 1644, and obtained several provinces by the treaty concluded at Bromsebro in 1645. Her subjects wished that she should choose a husband, but she manifested a constant aversion to marriage. During this time her patronage of learned men, artists, and the like was lavish. In 1650 she caused herself to be crowned

with great pomp, and with the title of *king*. From that time a striking change in her conduct was perceptible. In 1654 she abdicated in favour of her cousin Charles Gustavus. She became a Roman Catholic, and lived for a while in Paris. Subsequent attempts which she made to resume the crown of Sweden failed, and she spent the rest of her life in artistic and other studies at Rome.—BIBLIOGRAPHY: F. W. Bain, *Queen Christina of Sweden*; I. A. Taylor, *Christina of Sweden*.

Christison, Sir Robert, Bart. (1797–1882), Scottish physician. A specialist in toxicology, he was appointed to the chair of medical jurisprudence in Edinburgh in 1822, and in 1832 to that of materia medica. He was president of the Royal Society of Edinburgh.

Christmas, the festival of the Christian Church observed annually on 25th Dec. in memory of the birth of Christ. By the time of Chrysostom the Western Church had fixed on this day, though no certain knowledge of the day of Christ's birth existed. Many believe that the existence of heathen festivals celebrated on or about this day had great influence on its being selected, especially the Brumalia, a Roman festival held at the winter solstice, when the sun is as it were born anew. Most of the Christmas customs now prevailing in Europe are not genuinely Christian, but heathen customs, absorbed or tolerated by the Church. The cradle of Christ, the object of reverence in the Roman Catholic Church, is borrowed from the cult of Adonis, and Christmas games from the Roman Saturnalia.—BIBLIOGRAPHY: A. Tille, *Yule and Christmas*; C. A. Miles, *Christmas in Ritual and Tradition*; T. G. Crippen, *Christmas and Christmas Lore*.

Christmas Island, an island belonging to Britain, about 190 miles south of Java; area, 20 sq. miles; densely covered with forest trees and bushes, and rich in phosphate, which is mined and exported for use as a fertilizer. It is politically connected with Singapore. The inhabitants number about 1100, nearly all connected with the phosphate industry.—There is another British island of the same name, annexed to the Gilbert and Ellice Island Colony in 1919. It is planted with coconuts. Temporary pop. 42.

Christmas Rose, the *Helleborus niger*

(black hellebore), so called from its flower, which resembles a large white single rose; its foliage is dark and evergreen, and the plant blossoms during the winter months.

Christopher, St. (died c. A.D. 250), a martyr of the early Church. He is said to have carried Christ, in the form of a child, across a bridgeless river.

Christ's Hospital, or The Blue-coat School, a school, formerly in London, founded by Edward VI for supporting poor children. The school was removed from Newgate Street to Horsham in 1902. Many distinguished men have been connected with Christ's Hospital, notably Coleridge and Lamb.

Chromatin, in cells, that part of the nucleus which stains deeply on applications of aniline and other dyes. It is usually in the form of a network, which undergoes complicated changes during cell-divisions. It is believed to be the bearer and transmitter of hereditary characteristics.

Chromatophore, or Plastid, an important organ of the vegetable cell, found in all self-supporting plants. The name signifies 'colour-bearer', and the most familiar chromatophores are the carbon-assimilating *chloroplasts*, coloured green by chlorophyll.

Chrome Iron Ore, or Chromite, the chief ore of chromium, much in demand in connexion with the steel industry and the pigment trade. It resembles magnetite, but is red and translucent in very thin flakes, and is a member of the interesting 'spinellid' series of minerals. See *Spinel*.

Chromium (chemical symbol, Cr; atomic weight, 52), a greyish-white metal, discovered by Vauquelin, a French chemist, in 1797, occurring in combination with oxygen and metals, especially as chromite, $\text{FeO} \cdot \text{Cr}_2\text{O}_3$, or chrome iron ore, and in smaller quantity as crocoisite, PbCrO_4 , in Turkey, Greece, Siberia, and New South Wales. The metal is obtained by reducing the oxide Cr_2O_3 with aluminium, and is manufactured for the preparation of several important alloys. Thus it is used in the preparation of hard steels, chrome steel being very hard and resistant to fracture. Several compounds of chromium are of importance: chrome alum, $\text{Cr}_2(\text{SO}_4)_3 \cdot \text{K}_2\text{SO}_4 \cdot 24\text{H}_2\text{O}$, is used in calico-printing and in tanning. Potassium dichromate, $\text{K}_2\text{Cr}_2\text{O}_7$, and sodium dichromate, $\text{Na}_2\text{Cr}_2\text{O}_7$, are used in large quantities as mordants,

especially in dyeing wool, in photography, as oxidizing agents in the preparation of various organic chemicals, and as bleaching agents with sulphuric acid for some oils. Chromates of other metals are known, and these are used in many cases as pigments. The colour of the emerald and beryl is due to small quantities of oxide of chromium, and this oxide, Cr_2O_3 , chromium sesquioxide, is prepared and used as a green pigment for imparting colour to glass and porcelain. All chromium compounds are prepared from chrome iron ore.

Chromo-lithography, or printing in colours by lithography (q.v.), is a method of colour reproduction applicable to a large variety of originals, from simple crayon sketches, pastels, water-colours, &c., to elaborate oil-paintings. It is effected by a number of successive printings, one for each colour, so arranged as to give, when completed, as close a facsimile as possible of the original picture. For pictorial purposes chromo-lithography is now practically superseded by more recent methods of colour reproduction (see *Process Work*). So far as book illustrations are concerned, the present-day uses of chromo-lithography are chiefly confined to the printing of maps, for which it is admirably adapted. The process is also employed for commercial work, such as the production of coloured labels in vast quantities, and for advertisement 'posters', which call for broad effects and large masses of flat colours.

Chromosphere, a gaseous envelope surrounding the sun, and overlying the photosphere, or inner envelope of incandescent matter. It is seen in total eclipses as a red-coloured circle. It exhibits a spectrum of bright lines, indicating incandescent gases, mainly hydrogen, in the most elevated portions, and metallic gases or vapours lower down, and has a depth of about 6000 miles. 'Quiescent' prominences, composed chiefly of hydrogen and helium, resemble clouds of our atmosphere, and may remain unaltered for days. They appear in all solar latitudes. 'Eruptive' prominences, which consist mainly of metallic vapours ejected from the lower regions in violent eruptions, may shoot out to 100,000 miles in an hour's time. They frequent the sun-spot zones, and vary in number like the spots in an eleven-year cycle.

Chronicles, Books of, two books of the Old Testament which formed only one book in the Hebrew canon, in which it is placed last. Its division into two parts is the work of the Seventy (see *Septuagint*). The Hebrew name means 'events of the days', and is thus much the same as our 'journals'. The name *Chronicles* was given to it by Jerome. The book is one of the latest compositions of the Old Testament, and is supposed to have been written by the same hand as *Ezra* and *Nehemiah*.

Chronograph, the name given to various devices for measuring and registering very minute portions of time with extreme precision. In essentials a chronograph is a lever watch so arranged that at the start (say) of a horse-race, when the observer pulls a string a mark is made on the dial opposite the position of the second hand. Again, as each horse passes the winning-post the string is redrawn, and thus the time occupied by each horse is noted. An astronomical chronograph is operated electrically, and is used to register the exact time when a star crosses each wire in the field of the observer's telescope.—Cf. E. Mach, *Collected Papers on Chronographs*.

Chronology, the science which treats of time, and has for its object the arrangement and exhibition of historical events in order of time and the ascertaining of the intervals between them. Its basis is necessarily the method of measuring or computing time by regular divisions or periods, according to the revolutions of the earth or moon. The motions of these bodies produce the natural division of time into years, months, and days. As there can be no exact computation of time or placing of events without a fixed point from which to start, dates are fixed from an arbitrary point or *epoch*, which forms the beginning of an *era*. The more important of these are the creation of the world among the Jews; the birth of Christ among Christians; the Olympiads among the Greeks; the building of Rome among the Romans; the Hejira or flight of Mahomet among the Mahomedans; &c. As this method, however, is applicable only to the historic period, it became necessary to devise some other means of computing time, so as to obtain some knowledge of what took place on the globe prior to the later stages of human

civilization. This new departure of chronological research is founded on the science of geology. This method, however, deals only with the sequence of events, and its results may be termed *relative*, in contradistinction to *absolute* or *mathematical* chronology.—**BIBLIOGRAPHY**: Sir H. Nicolas, *The Chronology of History*; Woodward and Cates, *Encyclopædia of Chronology*; F. F. Arbuthnot, *The Mysteries of Chronology*.

Chronometer, any instrument that measures time; specifically, those time-keepers which furnish Greenwich time for determining the longitude at sea. The chronometer has a special form of escapement, so constructed that the balance is disconnected from the train during the greater part of its vibration, and there is a compensation adjustment for temperature. The chronometer generally beats half-seconds, and is hung in gimbals to keep it horizontal during the rolling of the ship. The navigator having found his local time by observation, and Greenwich time from the chronometer (after making certain allowances), is enabled from the difference, reckoned at 15° per hour, to determine his longitude. See *Navigation*.—Cf. J. W. Benson, *Time and Time-tellers*.

Chrudim, a town, Bohemia, Czechoslovakia, with some manufactures and large horse-markets. Pop. 13,550.

Chrysanthemum, a large genus of composite plants, consisting of herbs or shrubs with single, large-stalked yellow flowers or with many small flowers; the rays are sometimes white. Two species are common weeds in Britain, *C. Leucanthemum* (the ox-eye daisy), a meadow plant with white ray-flowers, and *C. segetum* (the corn-marigold), a cornfield weed with golden-yellow ray-flowers. The chrysanthemum of gardens is a Chinese half-shrubby plant (*C. sinense*), first introduced into Great Britain in 1790.

Chrysippus (c. 280–206 B.C.), Greek philosopher. He was one of the founders of the Stoic school, and is said to have written more than 700 different works, mostly of a dialectical character; but only fragments are extant.

Chrysoberyl, a pale, yellowish-green, very hard gem, found in Brazil in round pieces about the size of a pea. The variety *alexandrite*, from the Urals, is emerald-green, and red by transmitted light.

Chrysocolle, a green hydrous silicate of copper, rather more blue in tint and more porcellaneous in aspect than the common green carbonate malachite. It is an important though low-grade ore, and occurs in Chile and many mining areas.

Chrysolite, the most transparent form of *olivine* (q.v.), prized as a gem, and usually yellowish-green. Its hardness is scarcely below that of quartz.

Chrysophanic Acid, a yellow substance obtained from plants, especially *Andira araroba*: used as an ointment in psoriasis and other skin diseases.

Chrysostom, St. John ('golden-mouthed') (c. 345–407), Greek Father of the Church. He spent several years in solitary retirement, studying and meditating with a view to the Church. Having completed his voluntary probation, he returned to Antioch in 381, when he was appointed deacon by the Bishop of Antioch, and in 386 consecrated priest. He became so celebrated for the eloquence of his preaching that the Emperor Arcadius determined, in 397, to place him in the archiepiscopal see of Constantinople. He now exerted himself so zealously in repressing heresy, paganism, and immorality, and in enforcing the obligations of monachism, that he raised up many enemies, and Theophilus, patriarch of Alexandria, aided and encouraged by the Empress Eudoxia, caused him to be deposed at a synod held at Chalcedon. He was finally conveyed to a town on the most distant shore of the Black Sea. The officers who had him in charge obliged the old man to perform his journey on foot, and he died at Comana, by the way. His works, which consist of sermons, commentaries, and treatises, among which the principal are *On Priesthood* and *On the Statues*, abound with information as to the manners and characteristics of his age.—Cf. *Lives* of Chrysostom by W. R. W. Stephens, R. W. Bush, and Rev. F. H. Chase (Bishop of Ely).

Chrysotile, the crystallized form of the mineral *serpentine* (q.v.), occurring in delicate greenish or golden fibres, often set perpendicularly to the surfaces of cracks in massive serpentine, and used for the same purposes as asbestos.

Chub (*Leuciscus cephalus*), a river fish found in most English streams, and ranging through the greater part of Europe

to Asia Minor and Persia. The body is oblong, nearly round; the head and back green, the sides silvery, and the belly white. It frequents deep holes in rivers shaded by trees, but in warm weather floats near the surface, and furnishes sport for anglers. It is indifferent food, and rarely attains the weight of 5 lb.

Chubb-lock. See *Lock*.

Chubut, a territory and river of Patagonia, in Argentina. The territory is mostly arid, and ranching is the chief industry. Wheat and alfalfa are now grown, and oil wells are being developed. Gold, salt, and granite are mined. The capital is Rawson, near the coast. Area, 93,427 sq. miles; pop. 28,813. The river rises in the Andes, flows through the territory, and enters the Atlantic below Rawson. Its main tributaries are the Chico and Senguerr. Length, 500 miles, mostly navigable.

Chuck-Will's-Widow, a popular name in the United States for a bird of the goat-sucker family, *Antrostomus carolinensis*, so called from its cry.

Chumbul, a river of North-West India, which rises in the Vindhya Mountains, and falls into the Jumna about 90 miles south-east of Agra.

Chunar, a town and fortress, India, United Provinces, 26 miles south-west of Benares, on the Ganges. Pop. 9926.

Chungking, one of the open ports of China, on the upper course of the Yangtze Kiang, an important centre of trade, both in native and foreign goods, though, owing to the nature of the river channel, steamers that can ascend to Ichang cannot reach Chungking, the trade being carried on by native craft on this portion of the river. Pop. c. 750,000.

Chukisaca, a province of Bolivia; area, 36,132 sq. miles; pop. 333,226. Petroleum is found, and there are productive vineyards. The capital is Sucre.

Chur, capital of the Swiss canton of Grisons, on the Rhine. Not far from Chur the Rhine becomes navigable for small vessels. Pop. 15,600.

Church, a building specially devoted to Christian worship. After the conversion of Constantine, the basilicas or public halls and courts of judicature and some of the heathen temples were consecrated as Christian churches. When churches came to be specially built for Christian worship, their forms were various—Rangt,

octagonal, &c. Later on the form with the cross aisle or transept (*cruciform* churches) became common. Churches are classed as *cathedral*, when containing a bishop's throne; *collegiate*, when served by a dean and chapter; *conventual* or

day. Churchill, though in holy orders, became a complete man about town and a professional satirist. His other productions include: *The Ghost*, in which Dr. Johnson is satirized; *The Prophecy of Famine*, directed against the Scots; an *Epistle to Hogarth*; *The Conference*; *The Duellist*; *The Candidate*; and *The Journey*.

Churchill, Lord Randolph (1849–1895), English statesman, second son of the seventh Duke of Marlborough. Having entered Parliament in 1874, by 1884 he had risen to the position of a recognized leader of the Conservative party, and in 1886 became leader of the House of Commons and Chancellor of the Exchequer, posts which he unexpectedly resigned later in the same year.

Churchill, Winston Leonard Spencer (1874–), English politician, son of the above, was educated at Harrow and Sandhurst. He entered the army in 1895, and served with the Spanish forces in Cuba, the Malakand Field Force, the Tirah Expeditionary Force, and the Nile Expeditionary Force. In the South African War he was correspondent to *The Morning Post*. He entered Parliament as a Conservative in 1900, but became a Liberal when the Conservative party declared for Tariff Reform, and was elected for the Epping division of Essex in Oct., 1924, as a Constitutionalist. He was Under-Secretary for the Colonies, 1906–1908; President of Board of Trade, 1908–1910; Home Secretary, 1910–1911; First Lord of the Admiralty, 1911–1915; Chancellor of the Duchy of Lancaster, 1915; Minister of Munitions, 1917; Secretary of State for War and Air, 1919–1921; Secretary of State for the Colonies, 1921–1922; and Chancellor of the Exchequer, 1924–1929. His publications include: *Lord Randolph Churchill* (1906), *My African Journey* (1908), *The World Crisis 1911–1914*, and *My Early Life* (1930).

Churchill, Winston (1871–), American novelist. Many of his novels are studies of American history, and one of the best of these is his first success, *Richard Carvel*. Other books are: *The Crisis*, *The Crossing*, *The Inside of the Cup*, *A Far Country*, *A Traveller in Wartime*, and *The Dwelling-place of Light*.

Churchill River, a river of Canada, which rises in Saskatchewan, forms or passes through various lakes, and enters Hudson Bay after a course of 800 miles.



Church, Islip, Northamptonshire

1, Eastern end and great east window. 2, Chancel and its windows. 3, End of nave. 4, Clerestory and its windows. 5, South aisle. 6, South porch. 7, Tower. 8, Belfry windows. 9, Spire.

minster, when connected with a convent or monastery; *abbey* or *priory*, when under an abbot or prior; and *parochial*, when the charge of a secular priest.

Church, States of the. See *Papal States*.

Church Army, an institution in connexion with the Church of England, instituted by the Rev. Wilson Carlile in 1882, and essentially a working men's and women's mission to the lowest classes of the people, especially the degraded, the destitute, and the outcast. The headquarters are in London, and there are branches throughout the country, as well as in British colonies and the United States. All workers for the Army carry on their work under the supervision of the incumbent of the parish in which their work lies.

Churchill, Charles (1731–1764), English poet and satirist. In 1761 he published anonymously a poem called *The Rosciad*, a clever satire on the chief actors of the

Churching of Women, a public thanksgiving after child-birth in the Roman Catholic and Anglican Churches, the latter having a special service in the Prayer Book. It is a custom dating from the early Mosaic ages (cf. *Lev. xii, 6*).

Church-rate, in England, a rate raised by resolutions of a majority of the parishioners in vestry assembled, from the occupiers of land and houses within a parish, for the purpose of maintaining the church and its services. In 1868 an Act was passed abolishing compulsory church-rates, except such as, under the name of church-rates, were applicable to secular purposes.

Churchwardens, officers, generally two for each parish in England, who superintend the church, its property and concerns. They are annually chosen by the minister and parishioners, according to the custom of each parish.

Churchyard Beetle, the *Blaps mortisuga*, a common British insect found in dark, damp, and dirty places; it is black, but does not shine much, and the tip of the elytra forms a short obtuse point.

Chusan Islands, a group of islands on the east coast of China. Chusan, the largest, is 21 miles long and 6 to 11 miles broad. Pop. about 250,000. The chief town is Ting-hae; pop. 30,000. Rice and tea are the principal products. From its situation near the mouths of the Yangtze Kiang, Chusan is considered to be the key of China, and was temporarily taken possession of by the British in 1840, 1841, and 1860. It has a good and important harbour. The sacred island of Pu-tu, to the east of Chusan, is covered with Buddhist temples, monasteries, &c., and is entirely inhabited by priests.

Chuvash, since 1925 a constituent republic of the Russian Federation (R.S.F.S.R) (see *Russia*), founded as an autonomous region in 1920. It lies west of the Tatar republic and in the north is crossed by the Volga; area 7109 sq. m., pop. 893,724. The capital is Cheboksari.

Chyle. See *Digestion*.

Chyme. See *Digestion*.

Cibber, Colley (1671–1757), English actor and dramatist. His first play, *Love's Last Shift*, appeared in 1695, and it was followed by *Woman's Wit*, *The Careless Husband*, and *The Nonjuror*. A court pension and the appointment of Poet Laureate drew upon him the rancour of

the wits and poets of the day, including Pope. He is author of about twenty-five dramas, and the amusing *Apology for the Life of Colley Cibber*, which is also an important history of the stage during the reign of Queen Anne.

Cicada, the popular and generic name of certain insects belonging to the order Hemiptera. The males have on either side of the body a kind of drum, with which they can make a considerable noise. The largest European species are about an inch long, but some American species are much larger, and can be heard a mile off. They are nearly all natives of tropical or warm temperate regions. An English species (*C. anglica*) is found in the New Forest.

Cicero, Marcus Tullius (106–43 B.C.), Roman orator and statesman. At the age of twenty-five he came forward as a pleader, and having undertaken the defence of Sextus Roscius, who was accused of parricide, procured his acquittal. He visited Greece 79 B.C., made a tour in Asia Minor, and remained some time at Rhodes, where he visited the most distinguished orators. On his return to Rome he became one of the most distinguished orators in the forum. In 76 B.C. he was appointed quaestor of Sicily, and behaved with such justice that the Sicilians requested that he would conduct their suit against their governor Verres. Seven of his Verrine orations are preserved, but only two of them were delivered, and Verres went into voluntary exile. After this suit Cicero was elected to the office of aedile, 70 B.C., became praetor in 67, and consul in 63. It was now that he succeeded in defeating the conspiracy of Catiline. In 52 B.C. he became proconsul of Cilicia. As soon as his term of office had expired he returned to Rome (Jan., 49 B.C.), which was threatened with serious disturbances owing to the rupture between Caesar and Pompey. He espoused the cause of Pompey, but after the battle of Pharsalia made his peace with Caesar. After Caesar's death Cicero composed those admirable orations against Antony which are known to us by the name of *Philippics* (after the speeches of Demosthenes against Philip of Macedon). His implacable enmity towards Antony induced him to favour young Octavianus, who, however, was unable to prevent Cicero being proscribed. In endeavouring to escape from

Tusculum, where he was living when the news of the proscription arrived, he was overtaken and murdered by a party of soldiers; and his head and hands were publicly exhibited in the forum at Rome. Cicero's eloquence has always remained a model. After the Revival of Learning he was the most admired of the ancient writers; and the purity and elegance of his style will always place him in the first rank of Roman classics. His works, which are very numerous, consist of orations; philosophical, rhetorical, and moral treatises; and letters to Atticus and other friends.—BIBLIOGRAPHY: J. L. Strachan-Davidson, *Life of Cicero*; G. Boissier, *Cicéron et ses amis*; E. G. Sihler, *Cicero of Arpinum*.

Cid, or **Cid Campeador** (c. 1040–1099), the national hero of Spain. The facts of his career have been so mixed with glorifying myths that it is scarcely possible to separate them. His life, however, appears to have been entirely spent in fierce warfare with the Moors. The exploits of the Cid have furnished material for many dramatic writers, notably Guillen de Castro, whose work *Las Mocedades del Cid* formed the basis for Corneille's tragedy *Le Cid*.—Cf. H. Butler Clark, *The Cid Campeador*.

Cider, a fermented liquor made from the expressed juice of apples. The apples are ground and crushed until they are reduced to a pulp, and the juice is allowed to run into casks, where it is freely exposed to the air until fermentation takes place, when a clear liquor of a pale-brown or amber colour is the result. Worcester, Hereford, Gloucester, and Devon are the great cider-producing counties of England. The industry has also been revived with success in the north of Ireland. In France, Germany, and other countries, and particularly in North America, it is also largely made. It contains 5 to 10 per cent of sugar, and from 2 to 7 per cent of alcohol, and is intoxicating if drunk in quantities.

Cienfuegos, a seaport of Cuba, with a capacious harbour on the Bay of Jagua. The entrance is difficult owing to strong tides. The depth of the docks varies from 8 to 26 feet. It exports sugar, wax, tobacco, fruits, honey, and timber. Pop. 95,865.

Cieza, a town, Spain, in the province of Murcia, on an eminence near the right bank of the Segura. Pop. 14,400.

Cilia, microscopic threads of living substance, averaging $\frac{1}{1000}$ inch in length, found on the surface of the tissues of most animals, and in some vegetable organisms (as Volvox), chiefly on tissues which are in contact with water, or which produce fluid secretions. They are constantly in a state of active movement, and communicate to the fluid with which they are in contact a corresponding motion. This is called *vibratile* or *ciliary motion*. In most of the lower aquatic animals the respiratory function is aided by means of the vibratile cilia; many animalcules move by a similar mechanism; and in the highest classes of animals cilia have a share in the performance of some important functions.

Cilicia, in ancient geography, the region between Pamphylia and Syria, lying south of Mount Taurus. It is now in the vilayet of Adana.

Cimabue, Giovanni, properly named Gualtieri (1240–c. 1302), Italian painter. He is considered one of the chief Italian restorers of the art of painting, which at that time had degenerated into mechanical conventionalism. His best paintings are in the church of Santa Maria Novella at Florence, and in the Sacro Convento at Assisi. Among his pupils was Giotto.

Cimbri, a tribe of ancient Europe, the origin of which is involved in obscurity. Modern writers suppose them to have been Celtic. In the second century B.C. they made formidable incursions into Gaul and Spain, but were finally routed by the consul Marius at Vercelli, 101 B.C. (battle of the Raudine Plain).

Cimmerians, an ancient nomadic tribe who occupied the Tauric Chersonese (Crimea) and Asiatic Sarmatia (the country of the Lower Volga). A mythical people mentioned in the *Odyssey*, xi, 12–19, as dwelling beyond the ocean-stream in the thickest gloom were also termed Cimmerii, a fable which gave rise to the phrase 'Cimmerian darkness'.

Cimon (c. 507–449 B.C.), Athenian general and statesman, a son of the great Miltiades. He distinguished himself by his achievements in Thrace. Having defeated the Persians by the Strymon, he pursued the Persian fleet up the Eury-medon, destroyed more than 200 of their ships, and then, having landed, on the same day entirely defeated their army (469 B.C.). In 463 he reduced the revolted

Thasians; but the popular leaders, beginning to fear his power, charged him on his return with having been corrupted by the King of Macedon. The charge was dropped, but Cimon's policy of friendship to the Lacedæmonians ended eventually in his banishment. Cimon was recalled, at the instance of Pericles, to conclude a peace with Lacedæmon, but died shortly after.

Cinchona, an important genus of Rubiaceæ, consisting of trees seldom exceeding 40 or 50 feet in height, with simple, opposite, entire leaves and small flowers, a native of South America, but cultivated in British India, Java, Ceylon, and elsewhere. The valuable Peruvian bark is yielded by various species: crown or loxa bark by *C. Condaminea*, red bark by *C. succirubra*, yellow bark by *C. Calisaya* and *C. Ledgeriana*, the richest in alkaloids. Cinchona bark is extensively used in medicine as a tonic. Its action is somewhat like that of quinine (q.v.). It is also used in throat trouble.

Cinchonine, a vegetable alkaloid contained in all the varieties of Peruvian bark, but principally in *C. lancifolia*, or pale bark. Though less bitter than quinine, it may be substituted for it in larger quantities.

Cincinnati, a city of Ohio, U.S.A., on the River Ohio. It stands partly in a valley, partly on hills, and has an area of 24 sq. miles. There are many fine buildings, including a university, several colleges, and some magnificent churches. Cincinnati is an important manufacturing place, the chief articles being railway materials, machinery, carriages, furniture, leather, boots and shoes, &c. It has an immense trade in pork and pork products. In addition to the fine river, railways and canals stretch from it in every direction, connecting it with every port on the great lakes, and with Albany, Boston, New York, Philadelphia, and Baltimore. Pop. 406,312.

Cincinnatus, Lucius Quinctius (born c. 519 B.C.), a wealthy patrician in the early days of the Roman Republic. When Minucius was surrounded by the Æquians, the messengers of the Senate found Cincinnatus at work on his farm when they came to summon him to the dictatorship. He rescued the army from its peril, marched to Rome laden with spoil, and then returned quietly to his farm.

Cinematograph. There is no doubt

that the cinematograph has been evolved from very simple apparatus of earlier generations.

One of the first attempts at taking real moving pictures was made by W. Friese-Greene and M. Evans in 1889, and a lantern demonstration was given by them to the Bath Photographic Society in 1890. The accompanying diagram shows the general principle of all cinematograph apparatus.

In 1893 Edison invented a small apparatus called the *kinetoscope*, which, though not in general use, formed the basis of all modern cinematograph apparatus. It was the Kodak photographic film on a long,

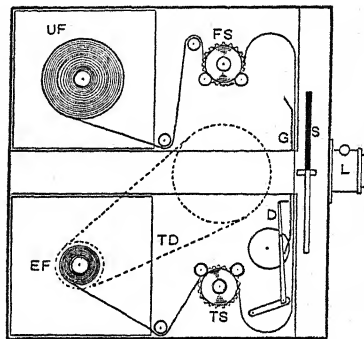


Diagram of General Arrangement of Camera

UF, Feed-box and roll of unexposed film. EF, Take-up box, into which exposed film passes. FS, Feed-sprocket. TS, Take-up sprocket. G, Gate. D, Driving-claw (intermittent mechanism). S, Shutter. L, Lens. TD, Tension drive.

flexible, celluloid ribbon which made cinematography possible. The size of the picture is only $1\frac{3}{8}$ inches \times $\frac{3}{4}$ inch, and a single reel may contain from 100 to 1500 feet of film, about 700 feet being required for a run of one-quarter hour, and about 5000 feet for a show of two hours.

In 1896 the biograph was invented by Herman Casler (U.S.A.), and in this instrument the pictures were $2\frac{5}{8}$ inches \times $2\frac{1}{8}$ inches, and he used friction-rollers in place of sprocket-wheels, the speed being thirty to forty pictures per second, in order to obviate flickering; but this arrangement did not become universal. The speed of the modern cinematograph is about twenty

pictures per second. If the picture, say of a man diving, be taken at a much greater speed, and it be then reproduced at the ordinary speed, the movements of the man will appear to be most deliberate; he will approach the water in a slow, gliding movement, and so on. On the other hand, if pictures be taken at long intervals, say of a growing plant, and then reproduced at ordinary speed, the whole growth of the plant may be witnessed in a few minutes. (See *Talking Pictures*.)—BIBLIOGRAPHY: B. E. Jones, *The Cinematograph Book*; F. A. Talbot, *Moving Pictures: how They are Made and Worked*.

Cineraria, a genus of plants, nat. ord. Compositæ, consisting of herbs or small shrubs with small-sized heads of flowers, found in South Africa.

Cinna, Lucius Cornelius (d. 84 B.C.), Roman patrician. When consul in 87 B.C. he impeached Sulla and endeavoured to secure the recall of Marius. He raised the Italian cities, and invested Rome while Marius blockaded it from the sea. On its capture the friends of Sulla were massacred, and Cinna and Marius made themselves consuls (86 B.C.); but after the death of Marius the army put Cinna to death.

Cinnabar, the principal ore of mercury, composed of mercury sulphide, occasionally including metallic mercury in its cavities. It has the high specific gravity of 8.09. The mines of Idria in Carniola, and Almaden in Spain, have been worked from Roman times.

Cinnamomum, a genus of plants, nat. ord. Lauracæ, natives of tropical Asia and the Polynesian Islands. All the species possess an aromatic volatile oil, and one of them yields true cinnamon, while others yield cassia and camphor.

Cinnamon, the bark of the under branches of a species of laurel (*Cinnamomum zeylanicum*), found in Ceylon and the East Indies. The tree attains the height of 20 or 30 feet, has oval leaves, pale-yellow flowers, and acorn-shaped fruit. An oil of cinnamon is prepared in Ceylon, but the oil of cassia (from *C. Cassia*) is generally substituted for it; indeed, the cassia bark is often substituted for cinnamon.

Cinnamon-stone (Essonite), a variety of Grossularite, the calcium-aluminium garnet, of a cinnamon, hyacinth-red, yellowish-brown, or honey-yellow colour.

Cino da Pistoia (1270-1336), Italian jurisconsult and poet. He was the friend of Petrarch and of Dante, and ranks amongst the best of the early Italian poets.

Cinq-Mars, Henri Coiffier de Ruzé, Marquis de (1620-1642), favourite of Louis XIII. The king made him Master of the Robes and Grand Equerry of France when only in his nineteenth year. Cinq-Mars concocted a plot for the overthrow of Richelieu, and entered into treaty with Spain. The king was compelled to sacrifice his favourite, who was arrested and beheaded. There is a novel *Cinq-Mars* by Alfred de Vigny.

Cinque Ports, the five English Channel ports of Hastings, Romney, Hythe, Dover, and Sandwich. They were granted special privileges by the later Saxon and earlier Norman kings, on condition of providing a certain number of ships during war, there being no permanent English navy previous to the reign of Henry VII. They are, collectively, in the jurisdiction of a lord warden, who receives £3000 a year for his sinecure.—Cf. F. M. Hueffer, *Cinque Ports*.

Cintra, a town, Portugal, 15 miles W.N.W. of Lisbon, finely situated on the slope of the Sierra de Cintra, and much resorted to by the wealthier inhabitants of Lisbon. Pop. 6000.

Ciotat, La, a seaport, France, on the Mediterranean, 15 miles south-east of Marseille. Shipbuilding is carried on, and there is an extensive coasting trade. Pop. 11,000.

Cipriani, Giambattista (1732-1785), Italian painter and engraver. He was one of the first Fellows of the Royal Academy, the diploma of which he designed. He furnished Bartolozzi with the subjects of some of his finest engravings.

Circars, **The Five Northern**, an ancient division of the Madras Presidency, on the east coast of India, the circars being Chicacole, Rajahmundry, Ellore, Condapilly, and Guntoor. The districts that now correspond most nearly with them are Ganjam, Vizagapatam, Godavari, and part of Krishna.

Circassia, a mountainous region in the south-east of European Russia, lying chiefly on the north slope of the Caucasus, partly also on the south, and bounded on the west by the Black Sea. The mountains, of which the culminating heights

are those of Mount Elbrus, are intersected everywhere with steep ravines and clothed with thick forests. Its climate is temperate, its inhabitants healthy and long-lived. The people call themselves Adighé, and are divided into several tribes speaking widely different dialects. While they retained their independence their government was of a patriarchal character, and they possessed none but traditional annals and laws. Their religion is nominally Moslem. Between the tenth and thirteenth centuries Circassia formed a portion of the Empire of Georgia, but in 1424 the Circassians were an independent people, and at war with the Tatars of the Crimea, &c., to whose khans, however, some were occasionally tributary. In 1705 the country was annexed by Russia. A heroic resistance was made by the Circassians under their leader Schamyl.—Cf. W. E. Curtis, *Around the Black Sea*.

Circe, in Greek legend, a sorceress who lived in the Island of *Ææa*, and is represented by Homer as having converted the companions of Ulysses into swine after making them drink enchanted wine.

Circle. See *Mensuration*.

Circuit, a division of a country for judicial purposes, applied to some town or towns to which judges come at regular periods to administer justice. In Britain a certain number of counties form a circuit, and the courts held at stated times by the appointed judges are called *assizes* or (in Scotland) *circuit courts*. (See *Assizes*.) The barristers who plead at these courts usually attach themselves to some special circuit.

Circular Notes, notes or letters of credit furnished by bankers to persons about to travel abroad. Along with the notes the traveller receives a 'letter of indication' bearing the names of certain foreign bankers who will cash such notes on presentation, in which letter the traveller must write his name. On presentation the foreign banker can demand to see the letter of indication, and by causing the presenter to write his name can compare the signature thus made with that in the letter, and so far satisfy himself as to the identity of the person presenting the note.

Circulation, in an animal, the flowing of blood from the heart through the arteries to all parts of the body, and its return to the heart by means of the

veins. It distributes to all the tissues the nutriment necessary for the maintenance of vitality as well as the oxygen to enable their activities to be performed; and it collects the waste products and conveys them to the organs that eliminate them from the system. Although Galen, who had observed the opposite directions of the blood in the arteries and veins, may be said to have been upon the very point of discovering the circulation, the discovery was reserved for William Harvey, who in 1628 pointed out the continuity of the connexions between the heart, arteries, and veins, the reverse directions taken by the blood in the arteries and veins, the arrangements of valves in the heart and veins so that the blood could flow only in one direction, and the necessity of the return of a large proportion of blood to the heart to maintain the supply. The modern theory of circulation in animals was not established till 1661, when Malpighi exhibited microscopically the circulation in the web of a frog's foot, and showed that the blood passed from arteries to veins by capillaries or intermediate vessels. The Mollusca have the heart provided with an auricle and a ventricle, as in the snail and whelk; two auricles, one on either side of the ventricle, as in the freshwater mussel; or two auricles and two ventricles, as in the ark-shells. Among the Ascidians, which may be regarded as degenerate representatives of the ancestors of Vertebrates, the remarkable phenomenon is encountered of an alternating current, which is rhythmically propelled for equal periods in opposite directions. All vertebrated animals (except *Amphioxus*) have a heart, which in most fishes consists of an auricle and ventricle, but in the mud-fishes (such as *Lepidosiren*) consists of two auricles and one ventricle; and this trilocular heart is found in the Amphibians, and in most reptiles except the crocodiles, which, like birds and mammals, have a four-chambered organ consisting of two auricles and two ventricles. In these two last-named classes the venous and arterial blood are kept apart; in the trilocular hearts the two currents are mixed in the ventricle. For circulation in man and the higher animals, see *Heart*.

Circumcision, a rite common amongst the Semites, though by no means peculiar to them, and possibly derived by them

from the Egyptians or from some non-Semitic source. It may have been, like tattooing, a tribal mark; or it may have been the rite of initiation into manhood and full membership of the tribe. Whatever its origin, the rite is confined to no single race, though infantile circumcision is almost solely practised by the Jews. The rite is practised by some of the peoples of Central America, and is still to be found amongst tribes on the Amazon, amongst the Australian tribes, the Papuans, the inhabitants of New Caledonia, and those of the New Hebrides. In Africa it is common amongst the Kaffirs and other tribes widely removed from Semitic influence. It is practised also by the Abyssinian Christians, and although not enjoined in the *Koran* has been adopted by the Mahomedans on the example of Mahomet himself.

Circus, among the Romans, a nearly oblong building without a roof, in which public chariot-races and exhibitions of pugilism and wrestling, &c., took place. The largest of these buildings in Rome was the *Circus Maximus*, capable, according to Pliny, of containing 260,000. The games consisted of: (1) Races with horses and chariots, in which men of the highest rank engaged. (2) The gymnastic contests. (3) The Trojan games, prize contests on horseback, revived by Julius Cæsar. (4) The combats with wild beasts, in which beasts fought with beasts or with men (criminals or volunteers). (5) Representations of naval engagements (*naumachiae*), for which purpose the circus could be laid under water. The expense of these games was often immense.

The circus of to-day is a milder show of feats of horsemanship and gymnastics and tricks of trained animals, interspersed with clever and amusing clowning. The popularity of the modern circus in England may be traced to that kept by Philip Astley at the end of the eighteenth century.

Cirencester (pron. sis'e-ter), a town of England, county of Gloucester, founded by the ancient Britons. It has a well-known Royal Agricultural College. The trade is agricultural. Pop. (1931), 7200.

Cirrhosis, a disease characterized by growth of fibrous tissue which gradually encroaches on and by compression destroys the true structure of the organ attacked. It frequently attacks the liver as a con-

sequence of spirit-drinking; and hence the term 'drunkard's liver'.

Cirripedes, **Cirripedia**, or **Cirrhopoda**, a class of marine invertebrate animals. They are crustaceans which have undergone retrograde metamorphosis. When adult they are affixed to some substance. Barnacles belong to this class.

Cisalpine Republic, a state set up in 1797 by Napoleon I in North Italy. It comprised Austrian Lombardy, together with the Mantuan and the Venetian provinces, Bergamo, Brescia, Crema, Verona, and Rovigo, the duchy of Modena, the principality of Massa and Carrara, Bologna, Ferrara, and Romagna. The Republic had a territory of 16,337 sq. miles, and a pop. of 3,500,000. The legislative body held its sessions in Milan. On 25th Jan., 1802, it received the name of the *Italian Republic*; from 1803 to 1814 it formed part of the Kingdom of Italy; and it was given to Austria by the Congress of Vienna in 1815 as the Lombardo-Venetian Kingdom.

Cistaceæ, a natural order of polypetalous Dicotyledons, consisting of low shrubby plants or herbs with entire leaves and crumpled, generally ephemeral, showy flowers. Four species of the genus *Helianthemum* are found in Britain, and are popularly known as 'rock roses'.

Cistercians, a religious order named from its original convent, Cîteaux (*Cistercium*), not far from Dijon, in Eastern France, where the society was formed in 1098 by Robert, Abbot of Molesme, who enforced strict observance of the rule of St. Benedict. Among the fraternities emanating from them the most remarkable were the Barefooted monks, or Feuillants, and the nuns of Port Royal, in France; the Recollets, or reformed Cistercians; and the monks of La Trappe. The Cistercians wear white robes with black scapularies.—**BIBLIOGRAPHY:** Henry Collins, *Spirit and Mission of the Cistercian Order*; J. S. Fletcher, *The Cistercians in Yorkshire*.

Cithæron. See *Elatea*.

Cithara, one of the most ancient stringed instruments, of triangular shape, with from four to twenty strings. It is traced back to 1700 B.C. among the Semitic races, in Egypt, Assyria, Greece, and the Roman Empire.

Citric Acid ($C_6H_8O_7$), the acid of lemons, limes, and other fruits. It is generally prepared from lemon-juice, and

when pure is white, inodorous, and extremely sharp in its taste. In combination with metals it forms crystalline salts known as citrates. The acid is used as a discharge in calico-printing and as a substitute for lemon in making beverages.

Citron. See *Citrus*.

Citronella Oil, an oil obtained from a kind of grass (*Cymbopogon nardus*), cultivated at Singapore and in Ceylon. It is used for scenting soap.

Citrus, an important genus of trees, nat. ord. Rutaceae, characterized by simple ovate acuminate leaves or leaflets united by a distinct joint to the leaf-like stalk, by having the stamens united by their filaments into several irregular bundles, and by yielding a pulpy fruit with a spongy rind. *Citrus Médica* is the citron with its varieties, *C. Limonum*, the lemon, and *C. acida*, the lime. Other species are the sweet orange (*Citrus aurantium*), the shaddock and grape fruit (*Citrus decumana*), with varieties *C. Bergama*, the bergamot, and *C. Bigaradia*, the Seville or bitter orange, the mandarin (*C. nobilis*), and the kumquat (*C. sunitara*). The orange would seem to have originated in China, the citron in Persia, and the lemon in Arabia. The best citrons and lemons come from Spain, Portugal, the Canaries, and the Azores. See *Lemon*; *Orange*.

Cittadella, an old town of North Italy, province of Padua. Pop. 11,300.

Città-di-Castello, a town, Italy, province of Perugia, on the Tiber. It manufactures silk and trades in wine and oil. Pop. (of commune), 27,700.

Città-Vecchia, a fortified town of Malta, near the centre and almost on the highest point of the island. The rise of Valetta has almost ruined it, and its numerous houses and palaces are now deserted. Pop. 7600.

Ciudad Bolívar (Angostura), a city of Venezuela, on the Orinoco, capital of Bolívar province. It has a large trade in gold, cotton, indigo, coffee, cattle, &c. Ships drawing 12 feet (16 feet August to December) ascend to the town. Pop. (1926), 16,762.

Ciudadela, a walled city and seaport, on the west side of the Island of Minorca; chief industries: weaving woollen fabrics, oil and wine making, and husbandry. Pop. 9870.

Ciudad-Real, a town of Spain, capital of the province of same name, on a low

plain near the Guadiana. It is an important agricultural centre. Pop. 20,000.—The province occupies the south extremity of New Castile, between the parallel ranges of the Sierra Toledo and Sierra Morena; it is rich in quicksilver. Area, 7620 sq. miles; pop. 433,366.

Ciudad-Rodrigo, a fortress in Spain, in Leon, on the River Aguada. Pop. 8080.

Civet (*Viverra*), a genus of medium-sized carnivorous mammals found in Africa and South Asia, and distinguished by having a secretory apparatus in which



Civet (*Viverra civetta*)

collects the odoriferous fatty substance known as *civet*. The chief species are the common civet (*Viverra civetta*) of Central and North Africa, and the Zibeth (*V. zibetha*) of South Asia. Civets are about the size of a fox, the Asiatic species somewhat smaller. In its natural state the smell is powerful and very offensive, but when largely diluted with oil or other materials it becomes an agreeable perfume.

Cividale del Friuli, a walled town, Italy, Venetia. It is rich in antiquarian relics. Pop. 10,031.

Civilization. See *Anthropology*.

Civil Law (*jus civile*), among the Romans the term nearly corresponding to what in modern times is implied by the phrase *positive law*, that is, the rules of right established by any Government. After the eleventh century, in Upper Italy, particularly in the school of Bologna, the body of the Roman law, put together by Justinian, was formed by degrees into a system applicable to the wants of all nations; and on this model the ecclesiastical and Papal decrees were arranged, and to a considerable degree the native laws of the new Teutonic states. From all these the Roman law was distinguished under the name of *civil law*. The expression *civil law* is also used to embrace all the rules relating to the private rights of citizens. Under the term *civil law*, therefore, in both Europe and America, is to be understood not only the Roman law, but also the modern private law of the various countries; for example, in Germany, *Das gemeine Deutsche Privatrecht*; in France, the *Code civil des Français* or *Code Napoléon*. In this sense it is chiefly opposed to *criminal law*.

Civil List, in Britain, formerly the whole expenses of the Government, with the exception of those of the army, navy, and other military departments. It is now limited to the expenses proper to the maintenance of the household of the sovereign. In the reign of William III, the Commons adopted the principle of separating the regular and domestic expenses of the king from the public expenditure, and establishing a systematic and periodical control over the latter. The amount actually voted to the king for life in 1697 was £700,000. On the accession of George III the Civil List was fixed at £800,000, but instead of being paid out of appropriated revenues in which the Crown lands were included, these were surrendered, and it was charged on the ordinary taxation. In the reign of William IV the List was cleared of all salaries, &c., upon it, and placed at £510,000, including a Pension List of £75,000. On the accession of Victoria a Civil List of £385,000 per annum was settled on Her Majesty for life, the Civil List being limited to the support of Her Majesty's household and the maintenance of the dignity of the Crown. The Civil List Act of 1910 fixes the Civil List at £470,000, of which £110,000 is appropriated to the privy

purse of the king and queen, £125,800 for salaries of the royal household and retired allowances, £193,000 for household expenses, £20,000 for works, £13,200 for alms and bounty, and £8000 remains unappropriated.

Civil Service, The, includes all offices under Government, exclusive of those directly connected with the army and navy. In Great Britain it comprises the Home Office, Foreign Office, Treasury, War Office, Admiralty, Post Office, Customs, Inland Revenue, and other departments. Formerly appointments to the civil service in Great Britain lay wholly in the gift of the executive Government, but in 1855 a system of examinations was instituted to test the efficiency of candidates; and in 1870 an Order in Council directed that henceforth appointments in the civil service should, with certain exceptions, be filled by open competition, as was already the case with the Indian civil service (q.v.). Appointments to ordinary clerkships in the civil service fall into two divisions or grades: the limits of age for the higher are 22 to 24, and for the lower 17 to 20. In the higher division the salaries are much better than in that below, the examinations being correspondingly more severe. Superannuation allowances are granted on the following general scale: one eightieth of salary for each year of service, together with a lump sum allowance equal to one thirtieth of salary for each year of service; a gratuity is payable in the event of death during service at the rate of a year's pay or more.—BIBLIOGRAPHY: G. E. Skerry, *Civil Service Manual*; F. G. Heath, *The British Civil Service*; E. A. Carr, *How to enter the Civil Service*.

Civitanova, a town of Central Italy, 12 miles west of Macerata. Pop. 11,230.

Civita Vecchia, one of the best seaports of Central Italy, lying in a barren and unhealthy district, 38 miles north-west of Rome. It has accommodation for ships drawing 22 feet, but the entrance is difficult. The trade is mainly in cement, sulphur, alum, &c. It is a fortified naval port, and has an arsenal, shipyards, cathedral, &c. Pop. 19,200.

Clackmannan, the smallest county of Scotland, containing little more than 54 sq. miles, situated on the north side of the Forth, by which it is bounded on the south-west. The north part of the county

is occupied by the Ochil Hills, which are largely given up to sheep-farming, but the other portions are comparatively level and exceedingly fertile, yielding large crops of wheat and beans. The minerals are valuable, especially coal, which abounds. There are also extensive ironworks and large breweries and distilleries; woollens are also manufactured, and tanning and glass-blowing carried on. The principal towns are Alloa, Alva, Tillicoultry, Dollar, and Clackmannan. The last is nominally the county town, but Alloa is much more important. Pop. of county, 32,543.

Clacton-on-Sea, a rising watering-place of England, on the Essex coast. It has convalescent homes, pier, sea-wall, and marine parade, and good bathing facilities. Pop. (1931), 15,851.

Cladonia. See *Reindeer Moss*.

Clairaut, Alexis Claude (1713-1765), French mathematician. He accompanied Maupertuis to Lapland, to assist in measuring an arc of the meridian, and obtained the materials for his work *Sur la Figure de la Terre*. In 1752 he published his *Théorie de la Lune*, and in 1759 calculated the perihelion of Halley's comet.

Clam, the popular name of certain bivalve shell-fish used as food in the United States. The best-known species are *Venus mercenaria*, *Macra solidissima*, and *Mya arenaria*.

Clamecy, a town of France, department of Nièvre, on the Yonne. Wood-rafts for the supply of Paris with firewood are made up here, and floated down the Yonne and Seine. Pop. 4869.

Clan, among the Highlanders of Scotland, a community of people descending from a common ancestor, and usually settled in one place or district. A clan was under the patriarchal control of a chief, who represented the common ancestor. The chief exercised his authority by right of primogeniture, as the father of his clan: the clansmen revered and served the chief with the blind devotion of children. In later times it was the policy of the Government in Scotland to oblige the clans to find a representative of rank to become security at Court for their good behaviour; the clans without a representative were called broken clans, and existed in a sort of outlawry. The most notable instance of a proscribed and persecuted clan was that of the ancient clan MacGregor. The rebellions of 1715 and

1745 induced the British Government to break up the connexion which subsisted between the chiefs and the clansmen. The hereditary jurisdiction of the chiefs was therefore abolished, the people disarmed, and even compelled to relinquish their national dress. Few traces of this institution now remain.

Clapham, a southern suburban district of London in the metropolitan borough of Wandsworth. Clapham Common is a fine open space of over 200 acres.

Clapperton, Hugh (1788-1827), Scottish traveller in Africa. Leaving Badagry, Dec., 1825, he penetrated to Katunga, within 30 miles of the Quorra or Niger, but was not permitted to visit it. He died of dysentery at Chungary, a village near Sokoto. He was the first European who traversed the whole of Central Africa from the Bight of Benin to the Mediterranean.

Claqueurs, the name given in Paris to a company of persons paid for applauding theatrical performances, more especially on the production of any new piece. This theatrical institution may be traced to the beginning of the nineteenth century. It is abolished in the Grand Opéra and the Comédie Française.

Clare, John (1793-1864), 'the Northamptonshire peasant poet'. In 1820 his *Poems Descriptive of Rural Life and Scenery* met with a favourable reception, and the issue of his *Village Minstrel* in 1821 won him many friends. He brought out a new work, *The Rural Muse*, in 1835, but became insane shortly afterwards, the remainder of his life, from 1837 to 1864, being passed in the Northampton Lunatic Asylum.

Clare, a maritime county (capital, Ennis) of Munster, Irish Free State, between Galway Bay and the Shannon estuary; area, 788,337 acres, of which 140,000 are under tillage. The surface is irregular, rising in many places into mountains of considerable elevation. Oats, potatoes, wheat, and barley are the principal crops. The chief minerals are limestone, lead, and slate. Lakes are numerous, but generally of small size, and the county is deficient in wood. The salmon-fisheries are valuable, and there are immense oyster-beds in some places. Pop. (1926), 95,028.

Clare Island, an island of County Mayo, Irish Free State, situated at the entrance to Clew Bay; length, 4½ miles; breadth, 2 miles. It has a lofty lighthouse.

Clarendon, Edward Hyde, Earl of (1609-1674), Lord High Chancellor of England. He commenced his political career in 1640, at first acting with the more moderate of the popular party, but gradually separating himself from the democratic movement until, by the autumn of 1641, he was recognized as the real leader of the king's party in the House. After vainly attempting to bring about a reconciliation between the contending parties he accompanied Prince Charles to Jersey. In Sept., 1649, he rejoined Charles at The Hague, and in 1657 was appointed Lord Chancellor. After Cromwell's death he contributed more than any other man to promote the Restoration, when he was placed at the head of the English administration. The marriage of the Duke of York with his daughter, Anne Hyde, confirmed for a time his power, but in 1667 the king deprived him of his offices, an impeachment for high treason was commenced against him, and he was compelled to seek refuge in Calais. During his second exile he completed his *History of the Rebellion* in autobiographical form.

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Clarendon, George William Frederick Villiers, fourth Earl of (1800-1870), British statesman. In Jan., 1840, he was appointed Lord Privy Seal, and in October Chancellor of the Duchy of Lancaster. In 1846 he was appointed President of the Board of Trade in Lord J. Russell's ministry, and in the following year Lord-Lieutenant of Ireland. Soon after the formation of the Aberdeen ministry he was appointed to the foreign secretaryship, which he held until Jan., 1855. After a few weeks' interval he returned to the post under Lord Palmerston, and retained it until 1858. In 1864 he was appointed Chancellor of the Duchy of Lancaster. In the following administration, under Russell, he resumed the direction of the Foreign Office. He again occupied the post of Foreign Secretary in the Gladstone ministry till his death.

Clarendon, Constitutions of, a code of laws adopted (Jan., 1164) at a council of prelates and barons held at the village of Clarendon, Wiltshire. By these laws the power of the ecclesiastical courts was restricted, the Crown secured the right of interference in elections to ecclesiastical

offices, appeals to Rome were made dependent on the king's leave, ecclesiastical dignitaries were deprived of their freedom to leave the country without the royal permission, &c. They were modified in 1176 at Northampton in favour of the Church, but they are not the less to be regarded as containing the germ of the ecclesiastical policy of Henry VIII.

Claretie, Jules Arsène Arnaud (1840-1919), French author. His publications include: *L'Assassin* (1866), *Puyjoli* (1890), *L'Accusateur* (1897), *Histoire de la Révolution de 1870-1* (5 vols., 1875-1876), *Cinq ans après* (1876), *La vie moderne au théâtre* (1868-1869), and *Histoire de la littérature française* (1905).

Clarinet, or Clarinet. See *Wind-instruments*.

Clark, Sir James (1788-1870), British physician. He became physician to the Duchess of Kent in 1835, and on the accession of Queen Victoria was appointed first physician in ordinary to the queen. His chief works were *The Influence of Climate in the Prevention and Cure of Chronic Diseases*, and a *Treatise on Pulmonary Consumption*.

Clark, Latimer (1822-1898), English engineer. He was one of the most prominent electricians of his time. Among his inventions were the 'double-cap invert' insulator and the Clark cell, which is still an important standard.

Clarke, Adam (1762-1832), Methodist divine and scholar. He published a *Commentary on the Scriptures* (1810-1826), a *Bibliographical Dictionary*, and other works.

Clarke, Charles Cowden (1787-1877), English writer. He was one of the minor members of the Shelley, Keats, and Leigh Hunt group. He is best known by the edition of Shakespeare which he annotated in conjunction with his wife, and by *The Shakespeare Key*.

Clarke, Edward Daniel (1769-1822), English traveller and mineralogist. In 1799 he set out on an extensive tour through Europe, Asia Minor, Syria, and Egypt, securing for English institutions many valuable objects, such as the celebrated manuscript of Plato's works, with nearly 100 others, a colossal statue of the Greek goddess Demeter (Ceres), and the famous sarcophagus of Alexander the Great.

Clarke, Sir Edward George (1841-1931),

British lawyer. He became Q.C. in 1880, and was Solicitor-General from 1886 to 1892. A Conservative in politics, he disagreed with the South African policy of his party in 1899, and resigned his seat; he was re-elected in 1906, but again disagreed with his party on the fiscal question. He published *The Story of my Life* in 1918, and in 1922 a book on Disraeli.

Clarke, Samuel (1675–1729), English theological and philosophical writer. He published *Essays on Baptism, Confirmation, and Repentance*, replied to Toland's *Amyntor*, and issued a paraphrase of the Gospels. In 1712 he published his *Scripture Doctrine of the Trinity*, which became a subject of much controversy and of complaint in the Lower House of Convocation. His chief subsequent productions were his discussions with Leibnitz and Collins on the freedom of the will, his Latin version of part of the *Iliad*, and a considerable number of sermons.

Clarke's River, a river of the U.S.A., rising in the Rocky Mountains and falling into the Columbia. Length, 700 miles.

Clarkson, Thomas (1760–1846), English emancipationist. His researches for a prize-essay at Cambridge roused in him a passionate antagonism to the slave-trade, and he allied himself with the Quakers and with Wilberforce. His labours went far to secure the prohibition of the slave-trade in 1807, and the Emancipation Act of 1833. His literary works include *History of the Abolition of the Slave Trade* and *Memoirs of William Penn*.

Claude, Jean (1619–1687), French Protestant preacher. His chief work was *Défense de la Réformation* (1673).

Claude Lorraine (1600–1682), French landscape painter whose real name was *Claude Gellée*, but who was called *Lorraine* from the province where he was born. The pictures painted by Claude number about 400. The private collections in England are very rich in specimens of his art. He excelled in luminous atmospheric effects, of which he made elaborate studies. He made small copies of all his pictures in six books known as *Libri di Verità* (Books of Truth), which form a work (usually called the *Liber Veritatis*) of great value to students.

Claudianus, Claudius (commonly called *Claudian*), a Latin poet, native of Alexandria, lived at the end of the fourth and beginning of the fifth century after Christ.

Besides several panegyric poems on Honorius, Stilicho, and others, we possess two of his epic poems, *The Rape of Proserpine* and an unfinished *War of the Giants*, eclogues, epigrams, and occasional poems.

Claudius, or, in full, Tiberius Claudius Drusus Nero Germanicus (10 B.C.–A.D. 54), Roman emperor. After the murder of Caligula he was dragged from his hiding-place and proclaimed emperor (A.D. 41). The early years of his reign were marked by the embellishment of Rome, the addition of Mauritania to the Roman provinces, and successes in Germany and Britain. He was poisoned by his fourth wife, Agrippina (mother of Nero).

Clausius, Rudolf Julius Emmanuel (1822–1888), German physicist. He was one of the founders of the modern science of thermodynamics. He was a foreign member of the Royal Society, and was awarded the Copley medal in 1879. He wrote, among other works, *Die mechanische Wärmetheorie* and *Die Potentialfunktion und das Potential*.

Claverhouse. See *Dundee, Viscount*.

Clavicorn Beetles (Clavicornes), a large group of coleopterous insects, of which the burying-beetle is a typical example.

Clay, Henry (1777–1852), American statesman. In 1806 he was elected to the United States Senate, and in 1811 to the House of Representatives, where he was at once made Speaker. He is best known for his endeavours to shut out European influences from America, and in connexion with the 'Missouri Compromise' of 1820, restricting slavery to the states south of lat. 36° 30' N.—Cf. Carl Schurz, *Henry Clay*.

Clay, a term popularly used for a mineral mass or rock which becomes distinctly sticky when wet, and which, when it contains a certain amount of moisture, clings to any surface presented to it. Very fine sand answers this description; but it falls to powder when dry, while true clay shrinks on drying into a tough mass broken by cracks. The characteristics of clay are, indeed, fundamentally a question of mineral constitution as well as of fine grain and the consequent large grain-surface. Minutely divided plates of kaolin, mica, and chlorite constitute the typical rock. Plasticity, or the power of retaining

on drying a form imparted to it when wet, is a property of the most typical and stiff clays, but not of all the materials that would popularly be styled clay. *Porcelain clay*, the rock form of *kaolin*, or *china clay*, is a pure white clay derived from the decay of alkali-feldspars in granite. It is essentially hydrous aluminium silicate, with some 47 per cent of silica. *Potter's clay* and *pipe-clay* are almost as pure, though pipes have been made from matter far more rich in silica. *Fire-clay* is a refractory type, owing to the absence of fusible compounds. *Loom* is a sandy clay, the sand lightening the clay for ploughing; *marl* is calcareous clay, and effervesces with acids. *Bole* is a ferruginous clay; *lithomarge* and the *ochres* are similar.

Claycross, a town of England, in Derbyshire, in a coal and iron district. Pop. (1931), 8493.

Clayton-le-Moors, a town of England, in the north-east of Lancashire, 4 miles N.E. of Blackburn, with calico-printing and other works. Pop. (1931), 7910.

Cleanthes (301–232 B.C.), Greek Stoic philosopher. He was a disciple of Zeno for nineteen years, and succeeded him in his school. Only some fragments of his works are extant.

Clear, Cape, a promontory 400 feet high at the southern extremity of Clear Island, and the most southern point of Ireland, about $7\frac{1}{2}$ miles south-east of Baltimore, County Cork.—Clear Island is about $3\frac{1}{2}$ miles long and about 1 mile broad. It has a fishing population of over 1000.

Clearing-house, an institution where payments, receipts, or claims are adjusted and differences settled, notably in connexion with banks and railways. In banking it originated in large cities with many banks, the sums due by and to the banks among themselves being set off against each other and the balance paid or received. The clearing-house system was first introduced in 1775. The *Railway Clearing-house* is an association representative of all the railway companies of the country, with a committee of superintendence, for the adjustment of through traffic, passenger and goods. The *British Clearing-house*, formed in 1842, has statutory authority to settle claims.—Cf. W. Howarth, *The Banks of the Clearing House*.

Clearing-nut (*Strychnos potatorum*), a

small tree of the same genus as the *nux vomica*, common in Indian forests. Its seeds being rubbed on the inside of a vessel containing turbid water speedily precipitate the impurities, this result being due, it is said, to the clarifying effect of the albumin and casein they contain.

Cleator Moor, a town of England, in Cumberland, with coal-mines and iron-furnaces. Pop. (1931), 6582.

Cleavage, the manner or direction in which substances regularly cleave or split. The directions in which crystallized bodies break up are called their planes of cleavage. The directions of the cleavages of a mineral depend upon its fundamental crystalline form. Moreover, all the varied crystalline forms of the same mineral species will, if the property of cleavage is present, cleave in the same directions, and thus a broken fragment is often highly useful in mineral determination. Cleavage in rocks depends on quite other causes, and is a parallel fissile structure induced by pressure and the consequent gliding of mineral particles.

Cleavers, Clivers, or Goose-grass (*Galium Aparine*), a common species of the bed-straw genus of plants, with hispid stem, leaves, and fruit, common in hedges and among bushes in Britain and other parts of Europe. The leaves are narrow and arranged in whorls, usually eight on each whorl.

Cleckheaton, a town of England, Yorkshire, West Riding. The industries include the worsted and machine-card trades, machine-making, engineering-works, &c. It is in Spenborough Urban District.

Cleethorpes, a watering-place of England, on the Lincolnshire coast, near Grimsby. Pop. (1931), 28,624.

Cleg, or Clegg, a name applied to blood-sucking flies belonging to the family Tabanidæ. Such are the great horse-fly, gad-fly, or breeze (*Tabanus bovinus*), the *Chrysops cæcutiens*, and the *Hæmatopota pluvialis*.

Cleistogamy, the production of flowers which never open and are therefore necessarily self-pollinated. Examples from the British flora are dog-violet and wood-sorrel.

Clematis, a large genus of woody leaf-climbers, comprising over 150 species, of the order Ranunculacæ. The most common species, *C. Vitalba*, virgin's bower or traveller's joy, is conspicuous in the hedges

both of England and the south of Scotland, first by its copious clusters of white blossoms, and afterwards by its feathery styles attached to the fruits. Among the exotic species are *C. flammula*, which produces abundant panicles of small white flowers, and has a fine perfume; *C. cirrhosa*, remarkable for its large greenish-white flowers; and *C. viticella*, with its festooning branches adorned with pink or purple bells. *C. virginiana* is an American species, known by the same name as the English; *C. Jackmanni* is a well-known garden hybrid. The fruit and leaves of the common clematis are acrid and vesicant.

Clemenceau, Georges Benjamin Eugène (1841–1929), French statesman and journalist. Elected to the Chamber of Deputies in 1876, he retained his seat till 1893. He soon attracted public attention through his independent action, his caustic and brilliant oratory, and his pithy utterances. In 1880 he founded a daily paper, *La Justice*, of which he became principal editor. He championed the cause of Captain Dreyfus in his paper *L'Aurore*. Elected Senator for the Var department in 1903, he became Minister of the Interior in 1906, and shortly afterwards succeeded Sarrien as Premier, remaining in office till 1909. During the European War he constantly attacked the Government, both in the Senate and in his paper *L'Homme Libre*, which he called for a time *L'Homme Enchaîné*. Clemenceau became Premier in Nov., 1917, and, at once displaying his characteristic energy, carried the war to a successful issue, and presided at the Peace Conference in Paris which resulted in the Treaty of Versailles. He resigned office in Jan., 1920, was nominated for the presidency of the Republic, but withdrew his candidature.—BIBLIOGRAPHY: J. McCabe, *France's Grand Old Man*; H. M. Hyndman, *Clemenceau: the Man and his Time*; C. Ducray, *Clemenceau: Writer, Citizen, Statesman*.

Clemens, Samuel Langhorne (1835–1910), American humorist, well known by his pseudonym *Mark Twain*. His chief books are: *The Jumping Frog, &c.* (1867), *The Innocents Abroad* (1869), *Tom Sawyer* (1876), *A Tramp Abroad* (1880), *Huckleberry Finn* (1885), *Tom Sawyer Abroad* (1893), *The Man that Corrupted Hadleyburg* (1900), *A Dog's Tale* (1904), and *Eve's Diary* (1906).—Cf. A. Henderson, *Mark Twain*.

Clement, properly Titus Flavius Clemens, commonly known as *Clement of Alexandria* (c. 150–c. 211), Greek Father of the Church. He was converted from paganism to Christianity, and became presbyter of the Church of Alexandria, and teacher in the school in that city. His chief remaining works are the *Protreptikos*, *Paidagōgos*, and *Strōmateis* (Patchwork). It is as a higher philosophic scheme that he mainly discusses Christianity.

Clement, Clemens Romanus, or *Clement of Rome*, one of the 'Apostolic Fathers', said to have been the second or the third successor of Peter as Bishop of Rome. Various writings are attributed to him, but the only one that can be regarded as possibly genuine is an *Epistle to the Corinthians*, first obtained in a complete form in 1875.

Clementi, Muzio (1752–1832), Italian pianist and composer. He was engaged as director of the orchestra of the opera in London; he went in 1780 to Paris, and in 1781 to Vienna. He finally settled in England in 1810. His most important compositions were his sixty sonatas for the pianoforte and the great collection of studies known as the *Gradus ad Parnassum*. His influence upon modern execution has led to his being characterized as 'the father of pianoforte playing'.

Cleomenes III, King of Sparta from 236 to 220 B.C. He made a new division of lands, introduced again the old Spartan system of education, and extended the franchise. He was defeated by the allied Macedonians and Achæans at the battle of Sellasia (222 B.C.) and fled to Egypt, where he committed suicide.

Cleon (d. 422 B.C.), an Athenian demagogue, originally a tanner by trade. In 425 he took Sphacteria from the Spartans; in 424 he was violently attacked by Aristophanes in the *Knights*. He was sent, however, in 422 against Brasidas, but was outgeneralled and killed.

Cleopatra (69–30 B.C.), Greek queen of Egypt. Being deprived of her part in the government (49 B.C.), she won Cæsar to her cause, and was reinstated by his influence. Cæsar continued some time at Cleopatra's court, had a son by her named Cæsarion, and gave her a magnificent reception when she subsequently visited him at Rome. After the battle of Philippi she sailed to join Antony at Tarsus; she accompanied him to Tyre, and was followed

by him on her return to Egypt. On the commencement of the war between Augustus and Antony the latter lost a whole year in festivals and amusements with Cleopatra at Ephesus, Samos, and Athens, and when at last the fleets met at Actium, Cleopatra suddenly took to flight, with all her ships, and Antony immediately followed her. They fled to Egypt. Believing Cleopatra, who had taken refuge in her mausoleum, to have killed herself, Antony threw himself on his sword, and shortly afterwards Cleopatra committed suicide by applying an asp to her bosom.

—BIBLIOGRAPHY: Sir J. P. Mahaffy, *History of Egypt under the Ptolemaic Dynasty*; P. W. Sergeant, *Cleopatra*.

Clepsydra, or **Water-clock**, an ancient instrument for the measurement of time by the escape of water from a vessel through an orifice. In the older ones the hours were estimated simply by the sinking of the surface of the water; in others the water surface is connected with a dial-plate and hand by a system of weights and floats. On water being admitted from the cistern the float rises, the counter-weight descends and turns the spindle, which again turns the hand that marks the hours.

Clergy, **Benefit of**. See *Benefit of Clergy*.

Clergy Discipline Act, an English Act passed in 1892, directed against immoral acts or conduct on the part of the clergy, facilitating procedure against offenders, and rendering deprivation of a benefice easy in the case of convicted persons.

Clerk, Parish, a lay officer of the Church of England, appointed either by the incumbent or the parishioners. It is his duty to lead the responses and assist in public worship, at funerals, and on other occasions.

Clerk of the House of Commons, an officer appointed by the Crown, whose duty it is to make minutes of the decisions of the House (not of the debates); to see that these minutes are correctly printed and handed to the members; to read aloud all such papers as the House may order to be read; and to perform the office of president (without taking the chair) during the choice of a Speaker.

Clermont-Ferrand, a town of France, capital of department of Puy-de-Dôme. The manufactures are more numerous than extensive; but the position of the

town makes it an important centre of trade. Pop. 82,577.

Clevedon, a coast town of England, Somerset, on the Severn estuary. It is a watering-place and winter-resort for invalids. Pop. (1931), 7033.

Cleveland, Grover (1837–1908), twenty-second President of the U.S.A. In 1884, having been nominated for the presidency by the Democratic National Convention at Chicago, he was elected on 4th Nov. Civil service reform and tariff reform were advocated by him during his tenure of office, which came to an end in 1889. President Harrison then succeeded, but Cleveland was again President from 1893 to 1897, when he retired into private life.

Cleveland, a district in the North Riding of Yorkshire, about 28 miles long and 15 miles broad, between the Tees and the coast at Whitby. It has extensive deposits of iron ore, which is smelted chiefly at Middlesbrough.

Cleveland, a city, in Ohio, U.S.A., on the south shore of Lake Erie. It is divided into two parts by the River Cuyahoga, and is beautifully situated, chiefly on an elevated plain above the lake. Cleveland is an important railway centre, has an excellent harbour and extensive lake traffic, and large manufactures, especially in iron and steel. Petroleum-refining and pork-packing are also important industries. There is a harbour of refuge constructed by Government. Pop. 888,519.

Cleves, a town in Rhenish Prussia, about a league from the Rhine, with which it is connected by a canal. It has manufactures of tobacco, leather, and cottons, and a mineral spring with baths. Pop. 18,135.

Clew Bay, a bay on the west coast of Ireland, County Mayo, containing a vast number of islets, many of them fertile and cultivated.

Clichy, a town about 4 miles north-west of Paris, of which it now forms a suburb. Pop. 50,165.

Cliff Dwellings, the name given to ancient dwellings of American aborigines, constructed in the precipitous cliffs that form the walls of gorges and canyons in some of the western states of the Union, especially Arizona, New Mexico, Colorado, and Utah. They were reached by ladders or other means from below, while inaccessible from above.

Clifford, John (1836–1923), English Nonconformist leader and author. He took an active part in the passive resistance movement against the Education Act in 1902. From 1858 to 1915 he was minister at the Baptist Chapel, Praed Street, Paddington, and at Westbourne Park. Among his publications are: *Is Life worth Living?*, *The Gospel of Gladness*, *State Education after the War*, and *The League of Free Nations*. He was made a Companion of Honour in 1921.

Clifford, William Kingdon (1845–1879), English mathematician. In 1871 he was appointed professor of applied mathematics at University College, London. In mathematics his teaching and writings are regarded as almost marking an epoch in the history of the science in Britain. He did more, perhaps, than any man to popularize in this country the new and fertile ideas of non-Euclidean Geometry and the Theory of Functions. His work *The Common Sense of the Exact Sciences* was completed by Karl Pearson and published in 1885; see also his *Mathematical Papers*, edited by R. Tucker, and *Lectures and Essays*, edited by L. Stephen and F. Pollock.

Clifton, a handsome residential suburb of Bristol (q.v.).

Clifton, a city of New Jersey, U.S.A., on Staten Island, practically a suburb of New York. Pop. 26,470.

Climacteric, a critical period in human life in which some great alteration is supposed to take place in the constitution. The first climacteric is, according to some, the seventh year; the others are multiples of the first; 63 is called the grand climacteric. In modern medicine, however, the term is most commonly applied to the menopause.

Climate. See *Geography*.

Climbing Perch (*Anabas scandens*), a singular fish, type of the family Anabantidae, remarkable for having the means by which it can live out of water for six days. The climbing perch of India proceeds long distances overland in search of water when the pools in which it has been living have dried up.

Climbing Plants are weak-stemmed plants which seek support from their surroundings, in order to rise from the ground. They are of four principal types: (1) *stragglers* or *scramblers*, which, as it were, lean upon other vegetation, weaving their

way between branches, and bearing recurved hooks or prickles that prevent them from slipping back, as the bramble and some tropical palms (*Desmoncus*); (2) *tendrils* *climbers*, which grasp twigs, &c., by means of tendrils, i.e. special organs sensitive to contact (often modified leaves or parts of leaves), e.g. vetches, Clematis, Tropæolum, vine; (3) *twiners*, which wind their stems around tree-trunks, &c., e.g. honeysuckle or scarlet runner: twining depends on a special form of *geotropism*; and (4) *root-climbers*, like ivy, which have special roots developing from the stem and adhering to the support.—Cf. Charles Darwin, *The Movements and Habits of Climbing Plants*.

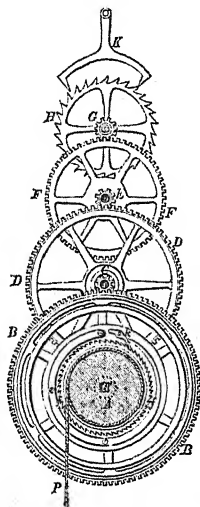
Clinton, a town of Iowa, U.S.A., on the Ohio, with railway workshops and foundries. Pop. 24,151.

Clitheroe, a municipal borough, England, in Lancashire. It is the seat of some large cotton-spinning and weaving establishments, paper manufactories, foundries, and printworks. Pop. (1931), 12,008.

Clive, Robert, Baron Clive (1725–1774), English general and statesman. In his nineteenth year he entered the East India Company's service at Madras as a writer, but in 1747 quitted the civil for the military service. In 1751 Clive marched on Arcot with 200 British troops and 300 sepoys, and took it, although strongly garrisoned, without a blow. In 1753 he sailed to England to recover his health, and was received with much honour. Two years later he was summoned to command the expedition sent to Bengal against the Nabob Suraj-ud-Dowlah. Clive soon took possession of Calcutta and brought Suraj-ud-Dowlah to terms, after completely defeating him at Plassey. Clive now visited England again, but in 1764 fresh troubles in India brought him back as President of Bengal, with command of the troops there. Before his arrival, however, Major Adams had already defeated the Nabob of Oude, and Lord Clive had only the arranging of the treaty by which the Company obtained the disposal of all the revenues of Bengal, Behar, and Orissa. In 1767 he finally returned to England. His health was by this time broken, and in one of his habitual fits of melancholy he put an end to his life.—**BIBLIOGRAPHY**: G. B. Malleon, *Lord Clive* (Rulers of India Series); Sir A. J. Arbutnot, *Lord Clive* (Builders of Greater Britain Series); Sir

John Malcolm, *Life of Clive*; Macaulay's *Essay on Clive*; H. Dodwell, *Dupleix and Clive*.

Clock, a mechanical instrument for measuring time and indicating hours, minutes, and usually seconds, by means of hands moving on a dial-plate. Early time-pieces were sun-dials, hour-glasses, and clepsydræ, and, though we have reference to clocks before the twelfth century, it is doubtful if any of these was a wheel-and-weight clock. In the twelfth century,

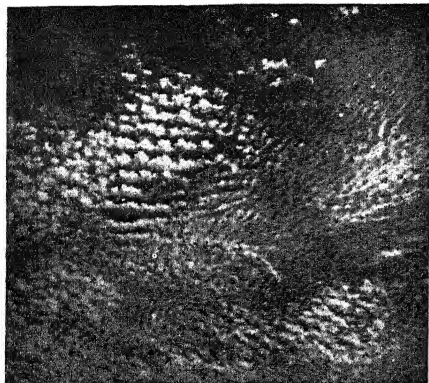


Clock-work

clocks used in monasteries announced the end of every hour by the sound of a bell put in motion by means of wheels. In the fourteenth century there are more traces of the present system of clock-work. Dante, for example, mentions clocks. Richard, Abbot of St. Albans, in England, made a clock in 1326. A celebrated clock, made by Henry de Vick, was set up in Paris for Charles V in 1379. It probably formed a model on which clocks were constructed for nearly 300 years, and until Huygens applied the pendulum to clock-work as the regulating power about 1657. The great advantage of the pendulum is that its beats all occupy substantially the same time (the time depending on its length), hence its utility in imparting regularity to a time-measurer.

The mechanism by which comparative regularity was previously attained, though ingenious and simple, was far less perfect; and the first pendulum *escapement*, that is, the contrivance by which the pendulum was connected with the clock-work, was also less perfect than others subsequently introduced, especially Graham's *dead-beat* escapement, invented in 1700 (see *Escapement*). Various improvements followed, such as the chronometer escapement, and the addition of a compensation adjustment, by which two metals having unequal rates of expansion and contraction under variations of temperature are combined in the pendulum or the balance-wheel, so that, each metal counteracting the other, the vibrations are isochronous under any change of temperature. This arrangement was perfected by Harrison in 1726, and is especially useful in navigation. The accompanying illustration shows the going part of a clock in its simplest form. A is a drum on which is wound the cord P, to which the weight is attached, the drum having a projecting axis with a square end to receive the key in winding up the clock. The drum is connected with B, the first wheel of the train, by means of the ratchet-wheel F and catch K, which allow the clock to be wound up without turning B. The wheel B drives the pinion C and the wheel D, the latter called the centre-wheel; and there is a similar connexion between D, E, F, G, and H. The last is named the escape-wheel, and into its teeth work the pallets of the anchor K, which swings backward and forward with the pendulum. The wheel D turns once in an hour, the wheel H 60 times (the pendulum marking seconds), and by means of other wheels, and one axis working inside another, the clock hands and dial show hours, minutes, and seconds. The chiming machinery of a clock, or that by which hours and quarters are sounded, is no necessary part of a clock, and forms, indeed, a separate portion of the works, usually driven by a separate falling weight, and coming into play at certain times, when there is a temporary connexion between the two portions of the clock machinery (see also *Watch*).—*Electric Clocks*. Since the decade 1840–1850 many forms of electric clocks have been designed. Much progress has been made in recent years. There are several distinct types in use to-day. (1)

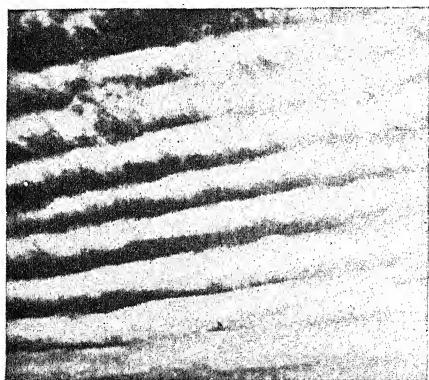
CLOUD FORMS



Cirro-cumulus: globular and waved forms



Cirrus: true type, showing thread structure



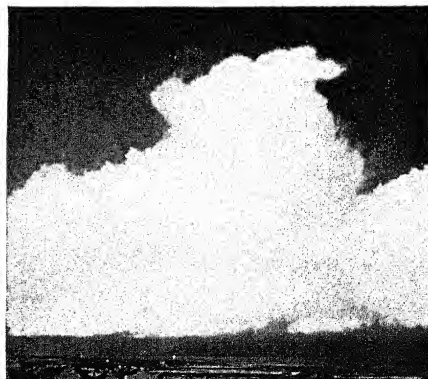
Alto-cumulus: in parallel bands



Strato-cumulus: heavy masses



Cumulus: detached typical form



Cumulo-nimbus: massive hail and shower clouds

Photographs by G. A. Clarke, F.R.P.S.

Self-contained clocks in which electricity provides the motive-power, usually by electro-magnetic impulses to the pendulum or balance. (2) Clocks with an independent power, but having the vibrations of their pendulums controlled by electric currents from a standard clock. (3) Clocks having an independent motive-power, wound by electricity. (4) Simple dial-works actuated at regular intervals, usually once per half-minute, or once per minute, by an electric current from a 'master'.—BIBLIOGRAPHY: F. J. Britten, *Old Clocks and Watches and their Makers*; H. H. S. Cunynghame, *Time and Clocks: Ancient and Modern Methods of Measuring Time*.

Clodd, Edward (1840–1930), British anthropologist. Among his writings are: *The Childhood of the World* (1872), *The Childhood of Religions* (1875), *The Story of Primitive Man* (1895), and *Magic in Names* (1920).

Cloisonné. See *Enamel*.

Clonmel, a borough of the Irish Free State, partly in County Waterford and partly in County Tipperary. It lies in a beautiful valley on both sides of, and on two islands in, the River Suir, carries on tanning, brewing, and flour-milling, and has a trade in agricultural produce. Pop. (1926) 8989.

Clontarf, a town of County Dublin, Irish Free State, on the northern shore of Dublin Bay. It is a much-frequented watering-place. Pop. 4613.

Cloots, Jean Baptiste, Baron (1755–1794), a singular character well known during the revolutionary scenes in France under the appellation of *Anacharsis Cloots*. He described himself as the orator of the human race. His enthusiasm for radical reforms, his hatred of Christianity and of royalty, and a gift of 12,000 livres on behalf of the national defence gained him, in Sept., 1792, election to the National Convention. But, becoming an object of suspicion to Robespierre, he was arrested and guillotined.

Close-season, a period of the year during which legal enactments or sporting custom prohibit the shooting or hunting of certain wild animals and birds. Otter-hunting is carried on from the middle of April to the middle of September. The fox, although protected by no written law, is not hunted between 1st April and 1st Nov.; no stags are killed between October and August, or hinds between

March and November. Partridges, pheasants, grouse, and many other game-birds are protected by law. Details of British close-seasons for all creatures affected may be found in most almanacs and annuals.

Closure, a rule in British parliamentary procedure adopted in 1882, by which, at any time after a question has been proposed, a motion may be made with the Speaker's or Chairman's consent "That the question be now put", when the motion is immediately put and decided without debate or amendment.

Cloud, a mass of fog or mist, composed of tiny particles of water, formed some distance above the ground, and floating in the atmosphere. In warm weather the ground is warmed, and ascending currents are set up. When the air rises, its pressure is reduced, and it is in consequence cooled by the expansion. Finally it comes to a level at which its temperature is no longer sufficient to contain its moisture in the invisible form. Condensation commences, and cloud is produced. When a warm and a cold current of air meet, the latter tends to pass under the former and force it up. Hence, also, cloud is formed, and possibly rain. A similar result follows from wind coming upon the inclined surface of a mountain. Warm air encountering a cold land- or sea-surface may also produce condensation of cloud or fog. A fall of atmospheric pressure, by the expansion and consequent cooling, is another cause. Cirrus, stratus, and cumulus are the three primary kinds of clouds, cirrus being light and wispy and usually preceding a storm, cumulus assuming the form of dense convex heaps and denoting fine weather, and stratus spreading out in a horizontal layer. Nimbus, preceding rain, is a great black cloud often covering the entire sky. There are numerous other kinds of clouds, such as cirro-cumulus, cumulo-nimbus, cirro-stratus, &c.

Cloudberry, or Mountain Bramble (*Rubus chamaemorus*), a fruit found plentifully in the north of Europe, Asia, and America, and common in some of the more elevated moors of Britain, of the same genus as the bramble or blackberry. The plant is from 4 to 8 or 10 inches high, with a rather large handsome leaf, indented and serrated at the edges. The flowers are large and white, and the berries, which have a very fine flavour, are orange-

yellow in colour, and about the size of a blackberry.

Clough, Arthur Hugh (1819–1861), English poet. He studied under Dr. Arnold at Rugby, and then at Oxford. His poems, of which the best known are *Bothie of Tober-na-Vuolich* (or *Tober-na-Fuosich*), *Amours de Voyage*, and the long poem *Dipsychus*, were published in 1862.

Clover, or Trefoil, a name of different species of plants of the genus *Trifolium*, nat. ord. Leguminosæ. There are about 300 species, of which 18 are natives of Britain. *T. pratense*, or common red clover, is a biennial, and sometimes, especially on chalky soils, a triennial plant. This is the kind most commonly cultivated, as it yields a larger product than any of the other sorts. *Trifolium repens*, or white clover, is a most valuable plant for pasturage over the whole of Europe, Central Asia, and North America. *T. hybridum*, Alsike, hybrid, or Swedish clover, has been long cultivated in the south of Sweden. *T. medium*, meadow clover, much resembles the common red, but differs somewhat in habit. The name clover is often applied to plants like medick and melilot, cultivated for the same purpose and belonging to the same natural order, although not of the same genus.

Cloves, a very pungent aromatic spice, the dried flower-buds of *Caryophyllus aromaticus*, a native of the Molucca Islands, belonging to the myrtle tribe, now cultivated in Sumatra, Zanzibar, Malacca, and Jamaica. The tree is a handsome evergreen from 15 to 30 feet high, with large elliptic smooth leaves and numerous purplish flowers on jointed stalks. Every part of the plant abounds in the volatile oil for which the flower-buds are prized. The spice yields a very fragrant odour, and has a bitterish, pungent, and warm taste. Cloves are used both in medicine and cookery.

Clovis (466–511), King of the Franks, succeeded his father, Childeric, in the year 481, as chief of the Salian Franks, who inhabited Northern Gaul. The influence of his wife Clotilda, a Burgundian princess, converted him to Christianity, and on 25th Dec., 496, he was baptized with several thousands of his Franks at Rheims, and was saluted by Pope Anastasius as “most Christian king”,

he being orthodox, while most of the Western princes were Arians.

Clown. See *Pantomime*.

Club. Among the earliest of the London clubs was the Kit-cat Club, formed in the reign of Queen Anne. Another club formed about the same time was the Beefsteak Club. Originally these two clubs had no pronounced political views, but in the end they began to occupy themselves with politics, the Kit-cat Club being Whig, and the Beefsteak Club Tory. Perhaps the most celebrated club of the eighteenth century was that which was first called *The Club par excellence*, and numbered among its members Dr. Johnson, Sir Joshua Reynolds, Edmund Burke, Oliver Goldsmith, Edward Gibbon, and others. This club was founded in 1764, and christened *The Literary Club* in 1779. The number of regularly established clubs in London is now about 150. The most important of these are: Army and Navy (1837); Athenæum (1824); British Empire (1910); Carlton (1832), a sort of headquarters for the Conservative party; Constitutional (1883); National Liberal (1822); Reform (1837); Turf (1868); and United



Clove Plant (*Caryophyllus aromaticus*)

Flower-bud, on left. Section of flower, on right.

Service (1815). Similar clubs exist also in Edinburgh, Glasgow, and other cities of the kingdom. — BIBLIOGRAPHY: John Timbs, *Clubs and Club Life in London*; R. Nevill, *London Clubs*; T. H. S. Escott, *Club Makers and Club Members*.

Club-foot (Lat. *Talipes*), a congenital distortion of the foot. There are several varieties. Sometimes the foot is twisted inwards (*T. varus*); sometimes the heel is raised and the toes only touch the ground (*T. equinus*); sometimes the foot is twisted outwards (*T. valgus*); or it rests only on the heel (*T. calcaneus*). In most cases the deformity is curable by modern surgery.

Cluj (formerly *Klausenburg* or *Kolozsvár*), a city of Romania, capital of Transylvania. It has a cathedral (founded 1414), a reformed church (founded 1486), a Magyar university (founded 1872), and a Romanian university (founded 1919). It was transferred by Hungary to Romania after the European War. It has woollen and linen manufactures. Pop. 60,808.

Clunes, an important mining-town in Victoria, Australia, 120 miles north-west of Melbourne. Pop. 3213.

Cluny, a town of Eastern France, department of Saône-et-Loire; pop. 4150. Here was a Benedictine abbey, founded in 910 by William I the Pious, Count of Auvergne. The abbey was at one time the most celebrated in France, having 2000 monastic communities directly under its sway in France, Italy, Spain, England, &c., the inmates of which formed the congregation of Cluniac monks. There is a national school of arts and trades.

Clutha, the largest river in New Zealand, in the southern part of the South Island. It receives the waters of Lakes Hawea, Wanaka, and Wakatipu, and is 150 miles long.

Clyde, Colin Campbell, Lord (1792–1863), British soldier. He served in Spain under Sir John Moore and Wellington, being engaged in the battles of Barossa and Vittoria. In 1842 he was in China in command of the 98th Regiment, and on the termination of the Chinese War saw active service in India, where he acquired much reputation in the Second Sikh War. In 1854 he became major-general, with the command of the Highland Brigade in the Crimean War. His services at the battles of Alma and Balaclava, and during the war generally, were conspicuous, so that on the outbreak of the Indian Mutiny he was appointed to the chief command there. Landing at Calcutta on 29th Aug., 1857, he relieved Havelock and Outram at Lucknow, and crushed the rebellion entirely before the

end of the year.—**BIBLIOGRAPHY:** L. Shadwell, *Life of Colin Campbell, Lord Clyde*; A. Forbes, *Colin Campbell, Lord Clyde*.

Clyde, a river of Scotland, which has its sources among the hills that separate Lanarkshire from the counties of Peebles and Dumfries, passes by Lanark, Hamilton, Glasgow, Renfrew, Dumbarton, and Greenock, and forms finally an extensive firth which enters the Irish Sea. From its source to Glasgow, where navigation begins, its length is 70 or 80 miles. Its principal tributaries are the Douglas Water, the Mouse, the Nethan, the Avon, the Calder, the North Calder, the Kelvin, the White and Black Cart, and the Leven. Near Lanark it has three celebrated falls: Bonnington Linn, Corra Linn, and Stonebyres, in connexion with which there is an important hydro-electric scheme. The Clyde, by artificial deepening, has been made navigable for large vessels up to Glasgow.

Clydebank, a burgh of Scotland, Dumbartonshire, of recent origin, on the north bank of the Clyde, 5 miles below Glasgow, with shipbuilding, &c. Pop. (1931), 46,963.

Clynes, John Robert (1869–), British politician. In 1906 he entered Parliament as a Labour member. He was Parliamentary Secretary to the Food Ministry in July, 1917, and succeeded Lord Rhondda as Food Controller in 1918. He was Lord Privy Seal from Jan. to Oct., 1924, and was Secretary of State for Home Affairs from 1929 to 1931.

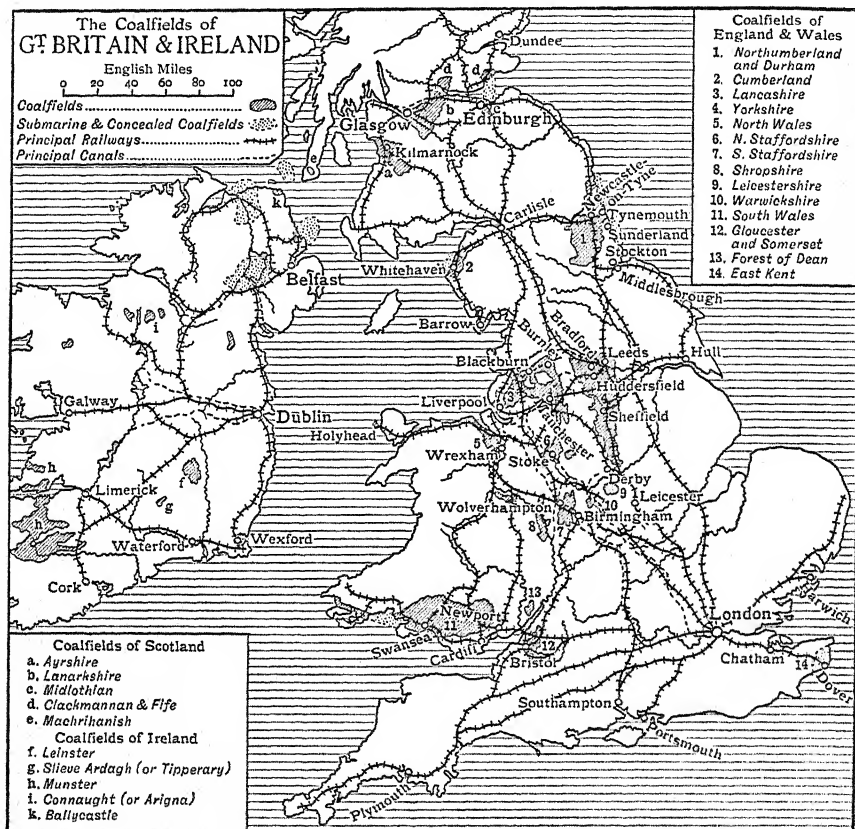
Clytemnestra, in Greek mythology, wife of Agamemnon. During the absence of her husband in the war against Troy she became the mistress of Ægisthus, and, in connexion with him, murdered Agamemnon on his return. Her son Orestes killed them both.

Coach, a general name for all covered carriages drawn by horses and intended for the rapid conveyance of passengers. Coaches were introduced into England about the middle of the sixteenth century, but were for long confined to the aristocracy and the wealthy classes. Hackney-coaches were first used in London in 1625. Stage-coaches were introduced into England about the same time as hackney-coaches. Their speed was at first very moderate, about 3 or 4 miles an hour. In 1700 it took a week to travel from York to London; in 1754 a body of Manchester merchants started a conveyance,

the Flying Coach, which did the journey to London in the unusually short period of four days and a half, and thirty years later a Mr. Palmer of Bath induced the Government to establish a system of mail-coaches, which continued to be the

mines; area, 63,786 sq. miles; pop. (1921), 391,335.

Coal, a solid, opaque, inflammable substance, mainly consisting of carbon, found in the earth, largely employed as fuel, and formed from vast masses of vegetable



means of travelling in England until their place was taken by the railways. The first mail-coach started between London and Bristol on the 8th of Aug., 1784.—BIBLIOGRAPHY: Sir W. Gilbey, *Early Carriages and Roads*; Ralph Strauss, *Carriages and Coaches: their History and their Evolution*.

Coahuila, a state of Mexico, on the frontier of the United States, rich in woods and pastures, and having several silver-

matter deposited through the luxuriant growth of plants in former epochs of the earth's history. In the varieties of coal in common use the combined effects of pressure, heat, and chemical action upon the substance have left few traces of its vegetable origin; but in the sandstones, clays, and shales accompanying the coal, the plants to which it principally owes its origin are presented in a fossil state in

great profusion, and frequently with their structure so distinctly retained as to enable the microscopist to determine their botanical affinities with existing forms. The great system of strata in which coal is chiefly found is known as the Carboniferous, and dates back to a time when the humbler types of vegetation predominated and grew to the size of forest trees. *Lepidodendron* and *Sigillaria* may be regarded as giant club-mosses, while *Calamites* is a large predecessor of the modern horse-tails. Tree ferns also were prevalent; but many of these are now known to have been seed-bearing (pteridosperms), and thus to have foreshadowed later types of flowering plants. A few coniferous trees also occur. Coals formed from later types of vegetation occur in other systems, such as the Jurassic coal of Sutherlandshire, and the Upper Cretaceous coal of Canada. Swampy ground or lagoon conditions seem essential for the preservation of large masses of decayed vegetation, and in many cases the coal-seams alternate with beds the fossils in which indicate marine incursions. There are numerous cases which testify to the decay of extensive forests and the preservation of their remains in place.

There are many kinds of coal, varying considerably in their composition, as *anthracite*, nearly pure carbon, and burning with little flame, much used for furnaces and malt kilns; *bituminous* (popularly so called) or 'household coal'; and *cannel* or 'gas coal', which burns readily like a candle, and is much used in gas-making. All varieties agree in containing from 60 to over 90 per cent of carbon, the other elements being chiefly oxygen and hydrogen, and frequently a small proportion of nitrogen. Coal is the most valuable of all the minerals which contribute to the wealth of Great Britain, and it has been mined there for many centuries. The development of the steam-engine by James Watt enormously increased the use of coal, and made it the basis of Great Britain's industrial importance. From about 10,000,000 tons at the beginning of the nineteenth century, the annual output rose to five times as much by 1850, and in 1913 the total was 287,430,473 tons of coal, value £145,535,669. In 1929 the world's production of coal was 1311 million tons, and the output in the United Kingdom 260,838,000 tons.

Coal forms one of the most important features of the British export trade; but coal, also of Carboniferous age, is largely mined in Belgium, in Northern and South-Eastern France, and in Westphalia and Silesia, while the Ukraine region of South Russia includes one of the largest coal-fields of the world. The United States have become coal-producers on an enormous scale, notably from the anthracite beds of Pennsylvania. Fields are undergoing development in India, in New South Wales, in Japan, and in China. The coal of Canada is of Carboniferous age in the east, and of Cretaceous age in the west. Various Commissions have made calculations as to the rate of depletion of British and other coal-fields. Considerable hopes of conservation are based on the erection of central power-stations, from which the energy contained in coal may be transmitted as electricity to distant areas. See *Coal-tar*; *Coke*; *Coke-ovens*; and *Mining*.—BIBLIOGRAPHY: H. W. Hughes, *Text Book of Coal-mining*; E. A. N. Arber, *Natural History of Coal* (Cambridge Manuals of Science); G. L. Kerr, *Practical Coal-mining*.

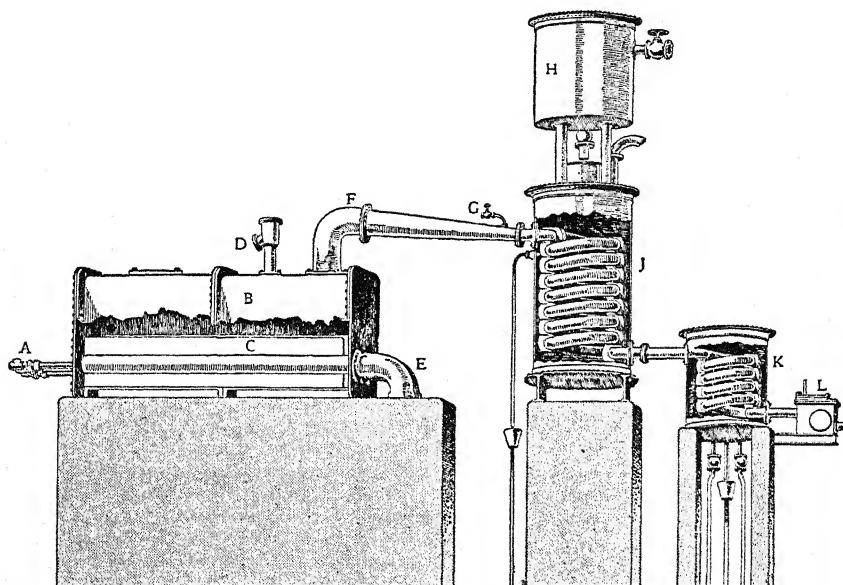
Coalbrookdale, a town and district in Shropshire, along the bank of the Severn. Important iron and limestone deposits are found, but coal is practically exhausted.

Coal-fish, a species of the cod genus (*Gadus virens*), named from the colour of its back, common on the British coast, and known in Scotland as the saithe.

Coaling-stations, ports conveniently situated on the great trade routes where ships may obtain coal. Most of these stations have also ship-repairing works, hospitals, and a supply of ship's stores of all kinds. Of recent years, too, the principal coaling-stations have acquired fuel-oil storage tanks. Most of the world's coaling-stations, in fact all those occupying key positions, are under the British Government, and their value to the Empire, especially in time of war, is inestimable. During the European War, Britain, by refusing to coal neutral ships unless the Governments of their respective countries agreed to British terms, was enabled to maintain food supplies. The principal coaling-stations of the world are: Gibraltar, Malta, Port Said, Perim, Aden, Colombo, Singapore, Hongkong, Newcastle (New South Wales), Hobart, Wellington, the Cape, Mauritius, the Falklands, Free-town (Sierra Leone), and Halifax.

Coal-tar, or Gas-tar, and Coal-tar Distillation. Coal-tar is a thick, black, strong-smelling liquid, heavier than water, which is obtained in the process of coal carbonization in gas-works and coke-ovens. It is a complex mixture of substances which are separated by distillation, and its value was only recognized when Perkin,

below 200° C. This preheating of the tar brings off the greater part of its water contents, and also the lightest hydrocarbons. The tar then passes through a series of stills, each fired to a definite temperature which fixes the grade of fractions obtained from that still. In the last of the series it is treated also with



Tar Distilling Plant

By permission of Messrs. W. C. Holmes & Co., Ltd.

A, Bunsen burners (source of direct heat). B, Cast-iron casing of still. C, Baffle plates (controlling flow of tar through stills). D, Safety valve. E, Ducts carrying products of combustion to flues. F, Vapour off-take from still to preheater. G, Steam inlet to condensing coil (to clear naphthalene deposits, &c., if necessary). H, Feed regulating tank (float valve to give constant head at feed adjusting cock. Latter just visible below tank). J, Preheater (for heat exchange between oil vapours and incoming tar). K, Water-cooled condenser for oil distillates. L, Sight overflow for distillates (also forming trap for uncondensed gases).

in 1856, discovered the aniline dye mauveine, the pioneer of a famous series. Aniline is derived from benzene, one of the numerous by-products of coal-tar distillation.

In the distillation plant shown in the illustration, the tar is first passed into a series of casings, one for each direct-fired still. Here it acts as the cooling medium for the oil-distilled vapours which are for the most part condensed at temperatures

live steam, which results in the last oil vapours being obtained without undue direct heating being used.

By further treatment of the fractions various commodities useful in commerce are obtained. (1) From the light oils are obtained benzene, toluene, xylene. Pure and crude benzol is used in the dye industry, as a solvent in dry cleaning, and as a substitute for petrol in motor-engines. Solvent naphtha may be redis-

tilled, yielding about 25 per cent best naphtha, and beyond 140° C., burning naphtha. It is used as a rubber solvent, as a paint thinner, and as a cleansing agent. (2) The middle oils, b.-p. 170–230° C. From the middle oils phenol (q.v.), cresols, and naphthalene (q.v.) are obtained. (3) The heavy or creosote oils, b.-p. 230–270° C., are a complex mixture, and are used as a timber preservative. (4) The anthracene or green oils, b.-p. 270–360° C. (see *Anthracene*). (5) Pitch. Pitch is used for bricketting, paints and varnishes, and street paving. The yield of purified products from tar is about as follows:

	Per cent.
Benzene and toluene	0.22
Xylene and solvent naphtha	0.62
Phenol	0.4
Cresols	1.13
Naphthalene	6.4
Anthracene	0.44

Coalville, a town of England, Leicestershire, with extensive coal-mines, railway-wagon works, &c. Pop. (1931), 21,886.

Coanza, a large river of Southern Africa, Lower Guinea, entering the Atlantic.

Coast-guards, a British force formed to prevent smuggling, and originally under the Customs Department. In 1858 it became a defensive as well as a preventive force, and the administration was transferred to the Admiralty. Since then the men have been drawn from the Naval Reserves. In addition to their main duties the Coast-guards man signal stations, keep meteorological records, attend to certain matters connected with the protection of fisheries, and keep a look-out for wrecks. The administration was handed over to the Board of Trade in 1923, and the total personnel in 1930 was 813 (623 in England, 143 in Scotland, and 47 in Northern Ireland).—*Cf. Report . . . on the Civil Duties of the Coastguard.*

Coasting-trade, trade carried on by sea between the ports of the same country. Since 1854 the coasting-trade of Great Britain has been open to foreign vessels. In other countries the coasting-trade is generally retained as a home monopoly. The strictest watch has to be kept on ships engaged in the coasting-trade. Goods can neither be taken on board nor unloaded at sea, and for a captain to depart from his route, except under stress of weather or of accident, is a punishable offence.

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The tonnage engaged in the British coasting-trade is 800,000, sailing ships representing 120,000 tons.

Coast Range, a range or series of ranges extending along the west of California at no great distance from the Pacific coast, and rising to the height of 8500 feet.

Coatbridge, a burgh in Scotland, Lanarkshire. The district abounds in coal and ironstone, and the place has rapidly grown to a thriving town, supported chiefly by ironworks and engineering establishments. Pop. (1931), 43,056.

Coati, or **Coati-mondi**, South American mammals belonging to the raccoon family, and distinguished by the possession of a long proboscis or snout.

Cobalt, a metal with the symbol Co, specific gravity 8.5; found chiefly in New Caledonia, and in Ontario Province, Canada. It is extracted from the ores *smaltine*, a heavy grey diarsenide of cobalt, iron, and nickel; and *cobaltine*, sulphide and arsenide of cobalt. The hydrous arsenate *erythrine* or *cobalt-bloom* forms delicate pink crusts, and thus calls attention to the grey arsenical ores. Black cobalt oxide occurs in conjunction with manganese oxides in some swamp deposits; this form of wad is called *asbolan*. The great use of cobalt is to give a permanent blue colour to glass and to enamel paints for metals, porcelain, and earthenware.

Cobalt, a town, Ontario, Canada, on Cobalt Lake. Mining is the chief industry, the district being the richest silver area in the world. Pop. 4449.

Coban, a cathedral city of Guatemala, centre of a great coffee district. Pop. 26,774, mainly Indians.

Cobar, an inland town of New South Wales, in a district rich in copper and gold. The Great Cobar mine is the chief copper-mine in the state. Pop. 4619.

Cobbett, William (1766–1835), English writer and politician. After serving in the army, he proceeded to America to commence as a political writer. In June, 1800, he sailed for England, and on his arrival started the *Weekly Political Register*, which became known as the most daring and uncompromising of the Government's opponents. About 1819 he commenced a series of papers entitled *Rural Rides*, which contain charming pictures of English country scenery. Cobbett is also the author of a *Parliamentary History of Eng-*

land from the Conquest to 1803, *Advice to Young Men and Women*, *A Geographical Dictionary of England and Wales*, *History of the Regency and Reign of George IV*, and *Village Sermons*. He wrote in a pure and vigorous English style, and his writings contain much useful information, and show a sound judgment wherever the matter did not go beyond his strong practical sense. — BIBLIOGRAPHY: E. Smith, *Life of Cobbett*; R. Huish, *Life of Cobbett*; Lewis Melville, *The Life and Letters of William Cobbett in England and America*.

Cobden, Richard (1804–1865), English politician, the 'apostle of free trade'. His first political writing was a pamphlet on England, Ireland, and America (1835), which was followed by another on Russia (1836). In 1841 Cobden entered Parliament as member for Stockport, and after several years of unwearied efforts at last induced Sir Robert Peel, then Prime Minister, to bring in a Bill for the repeal of the Corn Laws, a measure which became law in 1846. Next year he was chosen member for the West Riding of York, a constituency which he represented for ten years. His business, once highly prosperous, had suffered while he devoted himself to the agitation, and as a compensation for the loss he had thus sustained a national subscription was made, and a sum of about £70,000 presented to him. His last great work was the commercial treaty which he was the means of bringing about between Britain and France in 1860. See *Free Trade*; *Corn Laws*; *Protection*. — BIBLIOGRAPHY: Lord Morley, *Richard Cobden's Life*; W. E. A. Axon, *Cobden as a Citizen*.

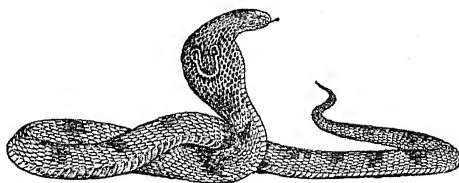
Cobh. See *Queenstown*.

Coblentz, a fortified town of Germany, Prussia, on the left bank of the Rhine in the angle between it and the Moselle. Its industries include the manufacture of cigars, machinery, champagne wines, and pianos, and it has an extensive trade in Rhine and Moselle wines. Pop. 56,676.

Cobourg, a port of Canada, province of Ontario, on Lake Ontario. It is on the Canadian Pacific Railway and the Canadian National Railway, and the harbour is open winter and summer. It has manufactures and an increasing trade. Pop. 5327.

Cobra de Capello, the Portuguese name of the hooded or spectacled snake *Naja tripudians*, which is found in

Southern Asia, a closely allied species (*Naja haje*), also called cobra, or asp, being found in Africa. Its bite is so very poisonous that the victim often dies within a few hours. Recovery is only possible when the necessary serum is



Cobra de Capello

administered at once. Its food consists of small reptiles, birds, frogs, and fishes; it is an excellent swimmer. Its great enemy is the ichneumon. It is one of the snakes exhibited by snake-charmers.

Coburg, part of the former German duchy of Saxe-Coburg-Gotha. It became a free state in 1918, but in 1920 was united to Bavaria. Area, 216 sq. miles; pop. 74,316. The chief town is Coburg.

Coburg, a town, Germany, Bavaria, on the left bank of the Itz. It has many fine buildings, including an ancient castle of the Dukes of Coburg, which contains memorials of Luther. Coburg has various manufactures, also extensive breweries. Pop. 24,701.

Coburg Peninsula, a peninsula on the north coast of Australia, in the Northern Territory of South Australia.

Coca (*Erythroxylon Coca*), a South American plant, nat. ord. Erythroxyleae. The leaf is a stimulating narcotic, and is chewed by the inhabitants of countries on the Pacific side of South America, mixed with finely-powdered chalk. It has effects somewhat similar to those of opium, and cocaine (q.v.) is obtained from its leaves.

Cocaine, $C_{17}H_{21}NO_4$, a white crystalline substance with a slightly bitter taste, is an alkaloid obtained from the leaves of *Erythroxylon Coca* and its varieties. It is invaluable in surgery as a local anaesthetic, and is used in eye affections to dilate the pupil. The effect of cocaine upon the central nervous system is to produce a condition of general restlessness and excitement. Care must be taken in its administration, for the most alarming symptoms have been known to follow even a quite small dose.

Cocanada, a seaport of India, on the coast of Madras, at the north-east angle of the Godavari delta, connected with the railways of Southern India, exporting rice, cotton, sugar, and oil-seeds. Pop. 53,348.

Coccus, a genus of insects of the order Hemiptera, family Coccidæ, or scale-insects. At a certain period of their life the females attach themselves to the plant or tree which they inhabit, and remain thereon immovable during the rest of their existence. Some of these insects are of great value. For example, kermes, cochineal, lac-lake, lac-dye, and gum-lac are either the perfect insects dried, or the secretions which they form. Kermes consist of the dried females of *Coccus ilicis*, found in great abundance upon a species of oak (*Quercus coccifera*), a native of the Mediterranean basin, and gathered before the eggs are hatched. It was known as a dye-stuff in the earliest times, but has partly fallen into disuse since the introduction of cochineal (q.v.).

Cochabamba, a town in the interior of Bolivia, capital of the department of Cochabamba, with a good trade and considerable manufactures. Pop. 31,014.—The department has an area of 25,288 sq. miles; pop. 534,901. It is rich in minerals, and agriculture and cattle-rearing are the chief occupations.

Cochin, a seaport, India, Malabar district, Madras Presidency, on a small island. Its harbour, although sometimes inaccessible during the south-west monsoon, is the best on this coast. It exports coconut oil, coir, tea from Travancore, fish-oil, teak, rubber, &c. Pop. 20,023.

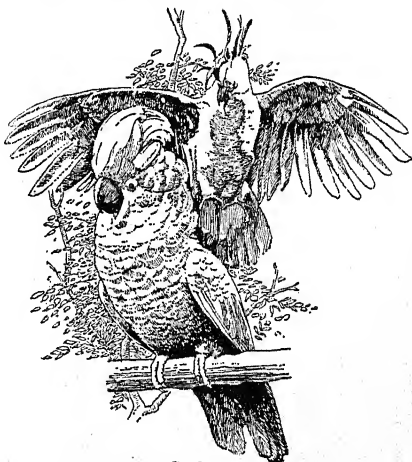
Cochin, a small native state of India, on the Malabar coast, connected with the Presidency of Madras. The chief products are timber, rice, and fibre. The rajah has to pay £20,000 annually to the Indian Government. Area, 1479 sq. miles; pop. 979,080, of whom many are Christians. The capital is Ernakolam.

Cochin-China, a country forming the south-east corner of French Indo-China. The area is roughly 22,000 sq. miles, and the population is 3,795,304 and very mixed. It is divided into twenty-one districts, each administered by a French officer. The northern and eastern parts are hilly, but the rest of the territory consists almost entirely of well-watered low alluvial land, where much rice is grown. In the more elevated districts are

grown tobacco, sugar-cane, maize, indigo, and betel. Among the other products are tea, gums, coco-nut oil, silk, and spices. The climate is hot and unsuited for Europeans. The native villages are adjacent to the rivers, which form almost the only means of communication. The only roads at present existing are those connecting Saïgon, the capital, with the principal towns; a railway, the oldest in Indo-China, connects Saïgon and Mytho. The principal exports are rice, pepper, fish-oils, cotton, and silk. Commerce is mostly in the hands of Europeans and Chinese. Fisheries are important. Saïgon and Cholon have rice-mills, soap-factories, and saw-mills. The majority of the inhabitants are Annamese, and closely resemble the Chinese.—Cf. A. Ireland, *The Far Eastern Tropics*.

Cochineal, a dye-stuff consisting of the dried bodies of the females of a species of insect, the *Coccus cacti* (see *Coccus*), a native of the warmer parts of America, particularly Mexico, and found living on a species of cactus called the cochineal-fig (*Opuntia (Nopalea) coccinellifera*). Cochineal produces crimson and scarlet colours, and is used in making carmine and lake (see *Dyeing*).

Cochrane, Lord. See *Dundonald*.



Cockatoos

Rose-crested (*Ptiliophus moluccensis*), perching.
Leadbeater's (*Cacatua Leadbeateri*), alighting.

Cockatoo, the name of a number of climbing birds belonging to the sub-order

of the parrots, or Psittacidae, or regarded as forming a distinct family, Plietolophidae or Cacatuidae. They have a large, hard bill; a crest, capable of being raised and lowered at the will of the bird, commonly white; long wings; and are found especially in the Eastern Archipelago and Australia. They live on roots, fruits, grain, and insects, and usually congregate in flocks.

Cockatrice, a fabulous monster anciently believed to be hatched from a cock's egg. It is often simply another name for the basilisk.

Cockburn, Sir Alexander James Edmund (1802-1880), Lord Chief Justice of England. In 1850 he was made Solicitor-General and knighted, and next year was made Attorney-General. From 1852 to 1856 he was again Attorney-General. In 1856 he became Chief Justice of the Common Pleas, and in 1859 Lord Chief Justice of England, holding this post at his death.

Cockburn, Henry Thomas, Lord (1779-1854), Scottish judge. He became, under Earl Grey, Solicitor-General for Scotland. His *Memorials of His Time* (published in 1856) is an invaluable record of the social history of Scotland. Not less interesting is his work *The Life of Lord Jeffrey*, published in 1852.

Cockchafer, a species of lamellicorn beetle, genus *Melolontha*, remarkable for the length of its life in the worm or larva state, as well as for the injury it does to vegetation after it has attained its perfect condition. The common cockchafer when full grown is over an inch in length, and commits great devastation on grass and corn crops. In its perfect state it is very destructive to the leaves of various trees.

Cocker, Edward (1631-1675), English teacher of arithmetic. His work *Cocker's Arithmetic*, upon which many succeeding treatises were framed, was published in 1678.

Cockermouth, a town in Cumberland, England, at the mouth of the Cocker. Thread and tweeds are manufactured, and there are coal-mines in the neighbourhood. Pop. (1931), 4789.

Cock-fighting, an amusement practised in various countries, first perhaps among the Greeks and Romans. It was long a favourite sport with the British, but is now prohibited by 12, 13 Vict. c. xcii.—Cf. Sir W. Gilbey, *Sport in the Olden Time: Cock-fighting*.

Cock-Lane Ghost, an impudent hoax by which many Londoners were deceived in 1762, consisting in certain knockings heard in the house of a Mr. Parsons, in Cock-Lane, Stockwell. Dr. Johnson was among those who believed in the supernatural character of the manifestations; but it was found out that the knockings were produced by the eleven-year-old daughter of Parsons.—Cf. A. Lang, *Cock-Lane and Common Sense*.

Cockle, a name for the bivalve molluscs of the genus *Cardium*, especially *Cardium edule*, common on the sandy shores of Britain, and much used as food.

Cock of the Woods. See *Capercaillie*.

Cockroach, the type of a family of insects belonging to the orthopterous or straight-winged order, characterized by an oval, elongated, depressed body, which is smooth on its superior surface. They are nocturnal in their habits, exceedingly agile, and devour provisions of all kinds. The common kitchen cockroach (in England commonly called *black beetle*) was originally brought from Asia to Europe, and thence to America, where it is now common.

Cock's-foot, or **Cock's-foot Grass**, a perennial pasture-grass (*Dactylis glomerata*) of a coarse, harsh, wiry texture, but capable of growing on barren, sandy places, and yielding a valuable food for sheep very early in the spring.

Coclé, an Atlantic coast province, Republic of Panama; pop. 42,219; capital, Penonomé. There is a large agricultural undertaking started in 1894 with German capital. There are 75,000 cocoa trees, 50,000 coffee bushes, and 25,000 caoutchouc trees.

Cocoa, or **Cacao**, the chocolate tree (*Theobroma Cacao*), nat. ord. Sterculiaceæ, and also the powder prepared from the fruit of this tree, and the beverage made with it. The tree is 16 to 20 feet high, a native of tropical America, and much cultivated in the tropics. The leaves are about 4 inches in length, smooth but not glossy, and of a dull-green colour; the flowers are saffron-coloured, and very beautiful. The fruit consists of pods 6 to 10 inches long. The cultivated trees bear fruit all the year round, but the gathering is chiefly in June and December. Each pod encloses fifty or more seeds in a white, sweetish pulp. The seeds or 'beans' are very nutritive, containing 50 per cent of fat (about 22 per cent being starch, gum, &c., and 17 per cent being gluten and

albumen), are of an agreeable flavour, and used, both in their fresh state and when dried, as an article of diet. Cocoa and chocolate are made from them, the former being a powder obtained by grinding the slightly-fermented and undried seeds. The seeds when roasted and divested of their husks and crushed are known as *cocoa nibs*. The seeds yield also a fat called cacao-butter, used in pomatum and for



Cocoa Plant

A, Old shoot bearing clusters of small flowers, and fruits in all stages of growth. B, Young leaf shoot. C, Ripe fruit, showing warted ridges. D, Seed, showing crumpled seed-leaves. E, Flower with its concave-spatulate petals.

making candles, soap, &c. Cocoa is the staple product of the Gold Coast, from which almost half of the world's supply comes (223,000 tons exported in 1924). Nigeria, the West Indies, Ecuador, and Brazil also produce large quantities of cocoa.

Coco-nut, a woody fruit of an oval shape, from 3 or 4 to 6 or 8 inches in length, covered with a fibrous husk, and lined internally with a white, firm, and fleshy kernel (the endosperm). The tree (*Cocos nucifera*) which produces the coco-nut is a palm, from 60 to 100 feet high. Each palm may yield from 100 to 300 nuts a year, and continue to do so for seventy to eighty years. The trunk is straight and bare, and surmounted by a

crown of feather-like leaves. The nuts hang from the summit of the tree in clusters of a dozen or more together. The external rind of the nuts has a smooth surface. This encloses an extremely fibrous substance, of considerable thickness, which immediately surrounds the nut. The latter has a thick and hard shell, with three black scars at one end, through one of which the embryo of the future tree pushes its way. This scar may be pierced with a pin; the others are as hard as the rest of the shell. The young nut encloses a sweet whitish liquid called the *milk*, which hardens and adheres to the shell, forming the kernel. The fruit can float for a long time in sea-water uninjured, and the milk provides a store of water for the germinating seedling. This palm is a native of Africa, the East and West Indies, and South America, and is now grown almost everywhere in tropical countries. Food, clothing, and the means of shelter and protection are all afforded by the coco-nut tree. All parts of the fruit are of use. Coco-nut oil (q.v.) and copra are obtained from its kernels; coco-nut matting and coir from the fibre. The shell, the fronds, and the trunk are used for a variety of purposes. Arrack is prepared from its flower-stalks, and a kind of sugar called jaggery from the juice.

Coco-nut Oil, a solid vegetable fat, largely used in candle-making and in the manufacture of margarine, soaps, and pomatum. This fat is got by pressure from the albumen of the coco-nut kernel, and is as white as lard, and somewhat firmer. Manila, Ceylon, and the Straits Settlements send large quantities of the oil to Britain, while the Dutch East Indies are extremely productive.

Cocos, or **Keeling Islands**, a group of 23 coral islands, Indian Ocean, 1200 miles south-west of Singapore. In 1903 they were annexed to the Straits Settlements and incorporated with the Settlement of Singapore. The largest island is 5 miles long by $\frac{1}{4}$ mile broad. There are large coco-nut plantations, and copra, oil, and nuts are exported. There is a wireless station on Direction Island. Pop. of group, 795. It was here that the German raider *Emden* was destroyed by H.M.A.S. *Sydney* in 1914.

Cocum-butter, or **Cocum-oil**, a pale, greenish-yellow, solid oil got from the seeds of *Garcinia purpurea*, a tree of the same genus as mangosteen, used in India to

adulterate ghee or fluid butter. It is sometimes mixed with bear's-grease in pomatums.

Cod (*Gadus*), a genus of well-known soft-finned fishes, of the same family as the haddock, whiting, ling, &c., distinguished by the following characteristics: an oblong or spindle-shaped body, covered with small soft scales; ventrals attached beneath the throat; gills large, seven-rayed, and opening laterally; a small beard at the tip of the lower jaw; generally two or three dorsal fins, one or two anal, and one distinct caudal fin. The most interesting species is the *common* or *Bank cod* (*G. morrhua*). The sea round the coast of Newfoundland is by far the best place for catching cod. It is a substantial and wholesome article of diet. The oil extracted by heat and pressure from the liver is of great medicinal value. The fishing-season lasts from April till the end of June, when the cod commence their migrations. The average length of the common cod is about 2½ or 3 feet, and the weight between 30 and 50 lb.

Code, in jurisprudence, is a name given to a systematic collection or digest of laws. The two chief codes which have affected the laws of Europe are the Theodosian Code (*Codex Theodosianus*), a compilation executed in 429 and promulgated as law throughout the Eastern and Western Empires; and the Justinian Code (*Codex Justinianus*), a code compiled in 528, incorporating all the codes, rescripts, and edicts previously in use. See *Civil Law*.

Codeine, a crystallizable alkaloid obtained from opium, in which it exists to the amount of 6 or 8 oz. per 100 lb. It is used in medicine to allay coughing, and as a mild hypnotic. It is also useful in diabetes.

Code Napoléon, the first code of the French civil law, promulgated on 31st March, 1804, and receiving the official name of *Code Napoléon* on 3rd Sept., 1807. Since 4th Sept., 1870, the laws have quoted it as the *Code Civil*. At present it is recognized in Belgium (with some modifications), and numerous recent codes have taken it as a model, such as the Dutch, Italian, and Spanish codes.

Codicil, in law, a supplement to a will, to be considered as a part of it, either for the purpose of explaining or altering, or of adding to or subtracting from the testator's former disposition. A codicil

may not only be written on the same paper or affixed to or folded up with the will, but may be written on a different paper and deposited in a different place. In general the law relating to codicils is the same as that relating to wills, and the same proofs of genuineness must be furnished by signature and attestation by witnesses. A man may make as many codicils as he pleases, and, if not contradictory, all are equally valid.

Cod-liver Oil, an oil prepared commercially by a process of steaming from the livers of different kinds of cod—the *Gadus morrhua* and allied species. Only the palest variety of the oil is used in medicine. It has several constituents, of which the chief are jeolein and therapin. The oil is of great value in medicine, and may be regarded as a food rather than a drug. It is the most easily assimilated of all fats, and is of particular use in all wasting diseases, e.g. tuberculosis, and where children have suffered from bad nutrition.

Codogno, a town in North Italy, province of Milan, in a fertile district between the Po and Adda, with a large trade in Parmesan cheese. Pop. 11,208.

Codrington, Sir Edward (1770–1851), English admiral. He obtained a gold medal for his services at Trafalgar, and was afterwards actively employed both in the Peninsular and second American Wars. In 1827 he commanded the united squadron that overthrew the Turkish fleet in the battle of Navarino.

Codrus, according to Greek legend, the last King of Athens. Having learned that the enemies of his country would be victorious, according to the declaration of an oracle, if they did not kill the Athenian king, he voluntarily entered their camp, provoked a quarrel, and was slain.

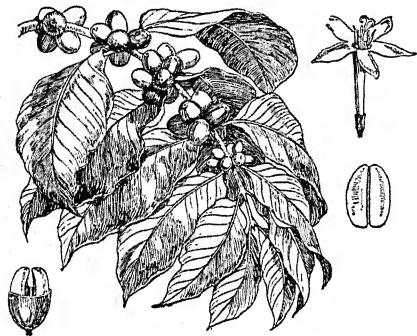
Coehorn, Menno, Baron van (1641–1704), Dutch military engineer. He fortified almost all the strong places in Holland, and invented a small mortar which bears his name.

Cœlenterata, a sub-kingdom of animals, in which the body is essentially composed of two cellular layers, an outer layer or 'ectoderm' and an inner layer or 'endoderm'. No circulatory organs exist, and in most there are no traces of a nervous system, but stinging organs are usually present. Distinct reproductive organs exist in all, but multiplication also takes place by fission and budding. The Cœlenterata

are divided into two great sections, the Actinozoa and Hydrozoa, and include the medusas, corals, and sea-anemones. They are nearly all marine animals.

Coële-Syria, the large valley lying between the Lebanon and Anti-Lebanon mountain ranges in Syria. Near its centre are the ruins of Baalbek.

Coffee is the seed of an evergreen shrub which is cultivated in hot climates, and is a native of Abyssinia and of Arabia. This shrub (*Coffea arabica*) is from 15 to 20 feet in height, and belongs to the Rubiaceæ. The leaves are green, and glossy on the upper surface. The flowers are white and



Coffea arabica

sweet-scented. The fruit is of an oval shape, about the size of a cherry, and of a dark-red colour when ripe. Each of these contains two cells, and each cell a single seed, which is the coffee as we see it before it undergoes the process of roasting. Great attention is paid to the culture of coffee in Arabia. A pound of coffee is generally more than the produce of one tree; but a tree in great vigour will produce 3 or 4 lb. The best coffee has its name from Mocha, on the Red Sea. It is packed in large bales, each containing a number of smaller bales, and when good appears fresh and of a greenish-olive colour. Brazil is at present the chief coffee-growing country. Java, Central and South America, Kenya, and India also produce considerable amounts. It is grown in many other parts of the world. The world's supply has been estimated at from 15 to 16 million bags (of 132 lb. weight). Coffee is extensively drunk in Continental countries, United States, and in the East. In

Britain, however, the public's taste is not critical of coffee adulterations, and the standard of preparation is 'miserably low'.

The excellence of coffee depends in a great measure on the skill and attention exercised in roasting it. If it be too little roasted it is devoid of flavour, and if too much it becomes acrid, and has a disagreeable burnt taste. Coffee is used in the form either of an infusion or a decoction. In the Asiatic mode of preparing coffee the beans are pounded, not ground; and though the Turks and Arabs boil the coffee, they boil each cup by itself and only for a moment, so that the effect is much the same as that of infusion. The refreshing action of coffee depends on the presence of about $1\frac{1}{2}$ per cent of *caffeine*, one of the purin bases, nitrogenous compounds allied to the alkaloids; this same substance, which is also present in tea (2 to 5 per cent) and to a less extent in cocoa (0.5 per cent), is a powerful brain-stimulant, and also a diuretic. As in the case of tea, the pleasant aroma is due to a volatile oil, which is largely developed by the roasting process.—BIBLIOGRAPHY: B. B. Keable, *Coffee, from Grower to Consumer*; J. Jotapen, *The Cultivation and Preparation of Coffee for the Market*.

Coffer-dam, a water-tight barricade formed to permit the laying of the foundations of quay-walls, bridge-piers, &c., and often used in salvage operations. It consists of two rows of wood or steel sheet piling driven in 2 to 4 feet apart, the interval being filled with clay puddle. The enclosed area is then pumped out.

Coffeyville, a town, U.S.A., in Kansas, on the River Verdigris. Pop. 13,452.

Coffin, the chest or box in which a dead body is enclosed for burial. Coffins were invented by the Egyptians during the fourth millennium B.C. They were of stone, earthenware, glass, or wood. Modern coffins are usually made of wood, in England generally of elm or oak, and are sometimes enclosed in a leaden case. Coffins for what is called 'Earth to Earth Burial' are made of wicker-work, covered with a thin layer of papier mâché over cloth. Coffins used in cremation are made of some light material easily consumed and yielding little ash.

Cognac, a town in France, department of Charente. It is famous for the brandy which bears its name, and which is exported to all parts of the world. Pop. 19,188.

Cognovit, in law, is a written confession given by the defendant that the action of the plaintiff is just, or that he has no available defence.

Cohesion, the force by which the various particles of the same material are kept in contact, forming one continuous mass. Cohesion acts at insensible distances, or between particles in contact, and is thus distinguished from the attraction of gravitation. It unites particles into a single mass, and that without producing any change of properties, and is thus distinguished from *adhesion*, which takes place between different masses or substances; and from *chemical attraction* or *affinity*, which unites particles of a different kind together and produces a new substance.

Cohoes, a city of Albany county, New York, U.S.A., on the west bank of the Hudson River, at the mouth of the Mohawk, with unlimited water-power derived from the Mohawk falls. It is a centre for worsted and knitted goods, and there are large cotton-mills and numerous other factories. Pop. 22,987.

Coimbatore, a town of India, Madras Presidency, capital of the district to which it gives name. It contains a school of agriculture. Pop. 65,788.—The district has an area of 7860 sq. miles. It is fertile, producing sugar, cotton, rice, and tobacco, and well watered by several rivers. Pop. 2,202,312.

Coimbra, a city of Portugal, province of Beira, on the River Mondego. The city was once the capital of Portugal, and contains the oldest university in the country. It has manufactures of linen, pottery, and articles of horn. The neighbourhood produces oil, wine, lemons, and oranges of excellent quality. Pop. 20,841.—The district of *Coimbra* has an area of 1508 sq. miles, and a pop. of 353,121.

Coin, a town, Spain, Andalusia, province of Malaga. It is the centre of a fruit district. In the neighbourhood are quarries of marble. Pop. 12,290.

Coining, a term used almost exclusively for the making of counterfeit money, though at one time it was synonymous with the present-day *minting*. The law concerned with offences against coin of the realm is codified in an Act of 1861. By this Act it is a high crime and offence, punishable by penal servitude for life, to counterfeit gold or silver coin, to deal in any way with counterfeit gold or silver

coin, and to make or possess any instruments for the purpose of counterfeiting gold or silver coin. The penalty for impairing or lightening gold or silver coin is fourteen years penal servitude, while seven years is the punishment for counterfeiting copper coin, or possessing or making instruments for counterfeiting copper coin, or for uttering base foreign gold or silver coin. The statute deems every offence complete even although the coin be in an unfit state for uttering. See *Mint*.

Cojedes, a state of Venezuela, in the north-west. The north is mountainous and wooded, but in the south there is a great plain on which horses and cattle are reared. The capital is San Carlos. Pop. of state, (1926), 82,153.

Coke, Sir Edward (1552–1634), English lawyer. He was chosen recorder of the cities of Norwich and of Coventry, knight of the shire for his county, and, in spite of the rivalry of Bacon, Attorney-General. In 1613 he became Chief Justice of the Court of King's Bench. His principal works are: *Reports, from 1600 to 1615*; *Institutes of the Laws of England*, in four parts, the first of which contains the celebrated commentary on Littleton's *Tenures* ('*Coke upon Littleton*'); *A Treatise of Bail and Mainprize*; and *Complete Copyholder*.—Cf. H. W. Woolrych, *The Life of Sir Edward Coke*.

Coke is the non-volatile residue of coal after distillation at a comparatively high temperature. When wood, peat, &c., have been distilled, the residue is usually called 'charcoal'; when coal, lignite, &c., have been destructively distilled out of contact with air, the residue is called 'coke'. Coke is a porous vesicular carbonaceous mass of irregular cells joined together by walls impervious to gases.

Coke is chiefly carbon and ash, but contains other elements also. This table shows the chemical composition of a coal and its coke:

	Coal.	Coke.
Carbon ..	80 per cent	88 per cent
Oxygen ..	8.8 "	Variable up to 3 per cent
Hydrogen	5.5 "	0.2 per cent
Nitrogen	1.5 "	2.0 "
Sulphur ..	0.8 "	1.0 "
Ash ..	3 to 4 per cent	5 to 8 per cent

Coke should be hard, if used for blast-furnace work, sonorous, and in colour may range from silver-grey to black. Coke is used in the ferrous and non-ferrous smelting-works; it is used as a reducing agent in chemical industry, e.g. in the manufacture of phosphorus; and as a fuel both in manufacture and in the home. There are other miscellaneous uses, e.g. as a filling material in scrubbers, in Leclanché cells, in carbon arc-lamps, &c. (See *Fuels*.) In industry, when coke is used as the fuel, a high efficiency may be obtained which is rarely approached by coal-fed boilers. Coke and coke breeze or dust is more suitable for marine, Lancashire, and Cornish boilers than for water-tube boilers.

Coke-ovens and Vertical Retorts. Coal may be carbonized to obtain either the maximum amount of gas, as in the gasworks, or of coke, as in the manufacture of metallurgical coke. For the latter purpose, especially where carbonization in bulk is desired, the coke-oven is most employed. Vertical retorts, as distinguished from the horizontal retorts of the gasworks, may be employed for either purpose.

The retorts and ovens in general use today are of many forms, the chief differences, however, being in details. The oven proper is generally a long chamber, about 30 feet long by 6 to 7 feet high by 17 to 20 inches wide. The retorts are charged at the top, and carbonization lasts about twenty-four to thirty-six hours. The by-products are recovered upon similar lines to those used in gasworks practice.—Cf. A. H. Sexton and W. B. Davidson, *Fuel and Refractory Materials*.

Colberg, a seaport and watering-place, Pomerania, Prussia, on the Baltic. It was once fortified. It manufactures chemicals, is a fishing centre, and exports grain, pit-props, and potatoes. It is a dangerous port to enter. The depth of the harbour is 16½ feet. Pop. 30,000.

Colbert, Jean Baptiste (1619–1683), French statesman. After serving in various subordinate departments Colbert was made Intendant, and at length Comptroller-General of the Finances. He at once commenced a system of stringent reforms, abolishing useless offices, retracting burdensome privileges, diminishing salaries, and distributing and collecting the taxes by improved methods till he had reduced them almost to one-half. He constructed

the Canal of Languedoc, granted premiums on goods exported and imported, regulated the tolls, and introduced the so-called Code Noir for the colonies. The French colonies in Canada, Martinique, &c., showed new signs of life; new colonies were established in Cayenne and Madagascar, and to support these Colbert created a considerable naval force. He also founded the Academy of Inscriptions (1663), the Academy of Sciences (1666), and the Academy of Architecture (1671).—Cf. Sargent, *Economic Policy of Colbert*.

Colchagua, a central Chilean province bounded by the Andes, the Pacific, O'Higgins Province, and Curico Province. Mining and cattle-rearing are the main industries. Area, 3851 sq. miles; pop. 166,342.

Colchester, a municipal borough and river-port, England, county Essex, situated on the summit and sides of an eminence rising from the River Colne. It has a good coasting trade, and employs a great number of small craft in the oyster-fishery, which belongs to the municipality. There are many interesting old buildings in the neighbourhood. The harbour has all facilities for vessels up to 200 tons. Pop. (1931), 48,607.

Colchicin, an alkaloid obtained from colchicum, used for the alleviation or cure of gout and rheumatism. It acts as an emetic, diuretic, and cathartic, in large doses as a narcotico-acrid poison.

Colchicum, a genus of plants, nat. ord. Liliaceae. The *Colchicum autumnale*, or meadow saffron, is common in parts of England. The small corm or bulb is important on account of the alkaloid colchicin (q.v.) obtained from it. Preparations from colchicum flowers, roots, and the corm itself are much used in medicine for gout and similar conditions.

Colchis, the ancient name of a region at the eastern extremity of the Black Sea, resting on the Caucasus.

Coldstream, a burgh of Scotland, in Berwickshire, on the Tweed. In its vicinity is the famous ford of the Tweed. Pop. (1931), 1233.

Coldstream Guards. See *Guards, Brigade of*.

Colebrooke, Henry Thomas (1765–1837), English Oriental scholar. He is considered to have been the pioneer of Sanskrit scholarship in Europe.

Colenzo, John William (1814–1883).

Bishop of Natal (consecrated 1853). He published treatises on algebra and arithmetic which were long popular textbooks. His work on the *Penitence* and *Book of Joshua* involved the author in a conflict with his ecclesiastical superiors, but the decisions of the Privy Council and Court of Chancery were in his favour.—Cf. Sir G. W. Cox, *Life of Bishop Colenso*.

Coleoptera, an order of insects, commonly known as *beetles*. They have four wings, of which the two front ones (*elytra*) are not suited to flight, but form a covering and protection to the two hind ones, and are of a hard and horny or parchment-like nature. The hind-wings, when not in use, are folded transversely under the forewings. The coleoptera undergo a perfect metamorphosis. The larva generally resembles a short thick worm with six legs and a scaly head and mouth.

Coleraine, a town, Ireland, Londonderry, on both sides of the River Bann. Its trade, chiefly in linen, agricultural produce, and provisions, is considerable. There is accommodation for ships of 600 tons drawing about 15 feet. Pop. 8080.

Coleridge, Hartley (1796–1849), English man of letters, eldest son of Samuel Taylor Coleridge. After graduating at Oxford he resided in the Lake country. In verse, his sonnets, and in prose, his biographies *Worthies of Yorkshire and Lancashire* and *Life of Massinger*, are the most important of his works. His life was written by his brother Derwent.

Coleridge, Samuel Taylor (1772–1834), English poet and philosopher. He was educated at Christ's Hospital and at Jesus College, Cambridge, where he remained for two years, winning the Browne medal for a Greek ode in 1792. After enlisting as a trooper in the 15th Dragoons, and entertaining a scheme of establishing a pantisocracy in America, Coleridge married Sara Fricker of Bristol in 1795. In 1796 he took a cottage at Nether Stowey, in Somersetshire, where, soothed and supported by the companionship of Wordsworth, who came to reside in Alfoxden, he wrote much of his best poetry, in particular *The Ancient Mariner* and the first part of *Christabel*. In 1800 he took up his residence beside Southey at Keswick, while Wordsworth lived at Grasmere in the same neighbourhood. These three poets were often spoken of as the 'Lake School'—a mere 'geographical expression'

not connoting a similarity in their work. About 1804 Coleridge went to Malta to re-establish his health, seriously impaired by opium-eating. In 1806 he returned to England, and after ten years of somewhat desultory literary work as lecturer and contributor to periodicals, took refuge from the world in the house of his friend Gillman at Highgate, London. Here he passed the rest of his days, holding weekly conversaziones in which he poured himself forth in eloquent monologues, being by general consent one of the most wonderful talkers of the time. As a critic, especially of Shakespeare, Coleridge's work is of the highest rank, combining a comprehensive grasp of large critical principles and a singularly subtle insight into details. Coleridge's poetical works include: *The Ancient Mariner*; *Christabel* (incomplete); *Remorse*, a tragedy; *Kubla Khan*; and a translation of Schiller's *Wallenstein*; his prose works, *Biographia Literaria*, *The Friend*, *The Statesman's Manual*, *Aids to Reflection*, and *On the Constitution of Church and State*. Posthumously were published specimens of his *Table Talk*, *Literary Remains*, and *Theological Notes*. The best edition of his works was issued in 1907 by the Clarendon Press.—BIBLIOGRAPHY: J. D. Campbell, *Life of Coleridge*; H. D. Traill, *Coleridge* (English Men of Letters Series); E. H. Coleridge, *Letters of Samuel Taylor Coleridge*.

Coleridge - Taylor, Samuel (1875–1912), British musical composer. His father was a West African of Sierra Leone. Among his works are: *Scenes from the Song of Hiawatha*, *Meg Blane*, and *The Blind Girl of Castèl-Cuillè*. He also wrote the incidental music to some of Stephen Phillips's plays.

Coleseed, a name for a variety of cabbage (*Brassica Napus*) and its seed, which is made into oil-cake for feeding cattle.

Colet, John (1467–1519), English divine and educationist. He founded St. Paul's School, and is rightly regarded as one of the pioneers of the Reformation.

Colic is a condition of spasmodic pain in the abdomen due to strong contractions of the muscular coats of any hollow tube within the abdominal cavity. Various forms are recognized: such as biliary colic, due to the passage of a gall-stone; renal colic, due to a calculus in the ureter; lead colic, which is intestinal colic, due to lead

poisoning; and uterine colic, due to abnormal contractions of the uterus during menstruation.

Coligny, Gaspard de (1519–1572), French admiral. After the death of Henry II, Coligny became the head of the Huguenot party. He was received with apparent favour at Court; but on the night of St. Bartholomew's (24th Aug., 1572) was basely slaughtered.

Colima, a town of Mexico, capital of the state of same name, above which rises the lofty volcano of Colima, which is constantly in a state of eruption. Pop. 25,148. On the coast about 30 miles s.s.w. of the city is the port Puerto de Colima, or Manzanillo.—The state has an area of 2272 miles; pop. 91,848. Coffee, sugar, cotton, and tobacco are grown.

Coll, an island on the west coast of Scotland, off Mull, county Argyll, about 12 miles long and from 3 to 3½ miles broad. A great portion of it is moorland, incapable of cultivation; but there are some tracts of light and sandy soil which are tolerably productive. Gaelic is universally spoken. Pop. (1931), 322.

Collectivism, a socialistic theory or system based on the doctrine that all the means of production in a State or community should belong to the members of the State or community collectively; that the State should be the only employer, there being no longer a class of capitalists; and that each worker or producer should receive the full value of what he produces, estimated according to the amount of time spent in producing it. The word is new, but the idea is found in every system of Socialism. See *Syndicalism*.

College (Lat. *collegium*), in a general sense, a body or society of persons invested with certain powers and rights, performing certain duties, or engaged in some common employment or pursuit. From ancient times there existed in Rome corporations called *collegia*, with various ends and objects. From the fourteenth century on, the word *college* meant in particular a 'community or corporation of secular clergy living together on a foundation for religious service'. In Great Britain and America some societies of physicians are called colleges. So, also, there are colleges of surgeons and a college of heralds. The most familiar application of the term college, however, is to a society of persons engaged in the pursuit of knowledge,

including the professors, lecturers, or other officers, and the students. See *University*.

Collège de France, a college in Paris founded by Francis I between 1518 and 1545, in opposition to the scholasticism of the universities. It has no connexion with the University of France, and the teaching given there is distinguished by its perfect freedom.

College of Justice, the supreme civil court of Scotland (that is, the Court of Session), composed of the lords of council and session (the judges), together with the advocates (= barristers), clerks of session, and writers to the signet.

Collembola, or spring-tails, a sub-order of small apterous insects which have great powers of leaping.

Collier, Jeremy (1650–1726), English divine and political writer. He is chiefly remembered now for his *Short View of the Immorality and Profaneness of the English Stage*. Literary textbooks are almost unanimous in saying that this was an excellent book which purged the stage of much uncleanness; as a matter of fact Collier was fanatical, ignorant, and irrational, and his pamphlets failed to effect any permanent reform.

Collier, John Payne (1789–1883), English Shakespearean critic and literary forger. He made himself notorious by claiming that he possessed a copy of the 2nd Folio Shakespeare, 1632, with many marginal emendations and annotations written in the middle of the seventeenth century, though, as was discovered, these notes were modern fabrications, probably by himself. None of his good work is nearly valuable enough to counterbalance the evil he wrought by his falsification of manuscript records.—Cf. C. M. Ingleby, *Complete View of the Shakespeare Controversy*.

Collingwood, Cuthbert, Lord (1750–1810), English naval commander. He entered the Royal Navy in 1761, and took part as flag-captain on board the *Barfleur* in Lord Howe's victory of 1st June, 1794, commanded the *Excellent* during the battle of Cape St. Vincent on 14th Feb., 1797, and was made Rear-Admiral of the White in 1799. But his most distinguished service was at Trafalgar, where he took command after the death of Nelson.

Collingwood, a port of Canada, province of Ontario, on Lake Huron, with a trade by rail and lake steamer, ship-

building and other industries. Pop. 5882.

Collins, Anthony (1676–1729), English deistical writer. His chief works are: *Discourse of Free Thinking, Philosophical Inquiry Concerning Human Liberty*, and *Discourse on the Grounds and Reasons of the Christian Religion*.

Collins, John Churton (1848–1908), English literary critic. He wrote many incisive articles for various periodicals, and was a sworn enemy of humbug and the pretensions of philologists to direct literary studies. His works include a study of *Dean Swift*, and *Greek Influence on English Poetry*.

Collins, Michael (1890–1922), Irish revolutionist. He took part in the Easter Rebellion of 1916, and eventually became head of the Irish Republican Army, and Minister of Finance. He was one of the signatories of the 'Treaty' of 1921 whereby the Irish Free State was set up, and was killed by Republicans in an ambush.

Collins, William (1721–1759), English poet. While studying at Oxford he wrote his *Persian Eclogues* (1742). In 1746 he published his *Odes*, containing pieces which now rank amongst the finest lyrics in the language. In 1753 his mind gave way; he lived for six years in a state of insanity, with occasional lucid intervals.

Collins, William Wilkie (1824–1889), English novelist. He collaborated with Dickens in several books, but his best novels, which are remarkable for ingenious plot-weaving, were entirely his own. They include: *After Dark* (1856), *The Woman in White* (1860), *No Name* (1862), *The Moonstone* (1868), *Man and Wife* (1870), *The Law and the Lady* (1875), *The Evil Genius* (1886), and *The Legacy of Cain* (1888).

Collision, in maritime affairs, the impact of one ship with another, or with a pier or other maritime structure, floating or fixed. If, as is usual, injury results and the collision was due to negligence in navigation or in the equipment of the ship or ships involved, the owner of each ship in fault is liable in damages. If more than one ship is to blame, the total loss is apportionable among the respective owners in proportion to the degree of fault of their ships (see Maritime Conventions Act, 1911). In all cases the liability of a shipowner for such damage is limited—in cases of damage to ship or cargo or both,

to £8 per ton of the gross tonnage of his vessel; and in the case of loss of life or personal injury, to an additional £7 per ton (see Merchant Shipping Acts, 1894 and 1906). Since 31st Dec., 1917, the shipowner is no longer protected from such liability by the fact that his vessel was in charge of a compulsory pilot responsible for the negligence in question (see Pilotage Act, 1913). To entail any liability for collision, negligence or fault must be proved.—**BIBLIOGRAPHY:** R. G. Marsden, *Treatise on the Law of Collisions at Sea*; D. W. Smith, *Law relating to the Rule of the Road at Sea*.

Colloidion, a substance prepared by dissolving pyroxyline (gun-cotton) in ether, or in a mixture of ether and alcohol, which forms a useful substitute for adhesive plaster, of use in surgery and in the manufacture of films.

Colloids. Substances which pass through certain membranes very slowly indeed, or not at all, are classed as colloids, to distinguish them from crystalloids, or substances which pass through the membranes quickly. Thomas Graham was the discoverer of the characteristic properties of colloids.

The separation of substances by means of diffusion through a membrane is called *dialysis*, and the phenomenon of non-diffusion of a colloid is held to-day to be due to the size of the particles composing the colloid being too great to allow the substance to pass through the interstices of the membrane.

Most substances known in the crystalloidal state can be obtained in the colloidal state, but some substances, e.g. the proteins, are as yet only known in the colloidal state. Practically all the most important metals have been obtained in the colloidal state, and then these metals have special properties. The most important organic substances in the colloidal state are starch, the dextrans, the gums, the tannins, rubber latex, glue and gelatine, the caseins and albumins, invertin, emulsin, trypsin, and cell protoplasm.

Colloidal solutions are called *sols*; when an insoluble substance separates out, it is called a *gel*. The solvent is called the *dispersion medium*; the mass of isolated particles is called the *disperse phase*.

Under suitable conditions the particles in the disperse phase can be seen to be in violent vibratory motion about a fixed

mean position. This was discovered by Brown in 1827, and the phenomenon is named after him. But the particle must be smaller than 3 to 5μ (1μ or micron = 0.001 mm.). It is supposed that the internal heat energy is the cause of the movements discovered.

Most hydrosols appear homogeneous to the naked eye, but if an intense beam of light is passed through a colloidal solution, and the illuminated field be viewed at right angles to the beam, the light is found to be diffracted by the dispersed particles.

In large dispersion, metallic hydroxides, some metals, and basic dyes like methyl-violet and methylene-blue have a positive charge. Most metals, metallic sulphides, aniline-blue, indigo, fuchsin, eosine, &c., including gamboge and starch, have a negative charge. Under the influence of a potential difference, the positively charged disperse phase moves to the cathode, and the negatively charged disperse phase moves to the anode. This 'wandering' under electrical influence is called *cataphoresis*.

Both chemical and electrical methods have been used to obtain colloids. Thus silicic acid is obtained in the colloidal state by dialysing a mixture of dilute hydrochloric acid and sodium silicate solution, or by prolonged boiling of freshly precipitated and washed silicic acid. The sulphides, again, are obtained by passing sulphuretted hydrogen through solutions under certain conditions, e.g. in neutral aqueous solution of arsenic trioxide, sulphuretted hydrogen gives colloidal arsenic sulphide. Colloidal elements are obtained by reduction in suitable media. Thus selenium is obtained by reducing selenic acid with sulphur dioxide solution. Similarly reduction methods serve for gold, silver, the platinum metals, mercury, and copper.

Gold and the platinum metals in the form of wire may be used as the terminals for the production of a small electric arc using a direct current. The metal is torn off in a cloud, and under water gives a colloidal solution. A similar method has been used to obtain the alkaline earths and alkali metals in colloidal form; also bismuth, mercury, carbon, silicon, selenium, &c., and minerals such as magnetite, copper glance, &c.

Colloidal chemistry is one of the most

recent branches of chemical knowledge to be pressed into the service of man. It is of fundamental importance in agriculture, medicine, mineralogy, glass manufacture, and photography; in fermentation processes, in tanning, in dyeing, and in the industries which deal with earthenware clay, cement, sugar, rubber, starch, gum, gelatine, nitrocellulose, and celluloid. In the textile industries, in breadmaking, in the petroleum and asphalt industries, in the paint and varnish industry, and in many departments of physiological and biochemical science colloids play a very large part.

Collet d'Herbois, Jean Marie (1750-1796), French revolutionary. Prior to the Revolution he was an actor in the provinces and a dramatist, but on its outbreak he became a leader of the 'Moulin-tain', introduced the Terror into Lyons in its worst form, opposed Robespierre, contributed to his fall, and was banished to Cayenne. His works include: a play called *Le paysan magistrat*, and the *Almanach du Père Gérard*, a book written in praise of a constitutional monarchy.

Collusion, in law, a secret agreement between opposing litigants to obtain a particular judicial decision on a preconcerted statement of facts, whether true or false, to the injury of a third party. As applied to divorce proceedings it has been defined thus: "The presenting or prosecuting of a petition for divorce, by arrangement or agreement between the parties, such arrangement or agreement being contrary to the law of this country". Collusion is an absolute bar to divorce, both in England and Scotland.

Colman, George ('the Elder') (1732-1794), English dramatist. He was very successful with *The Jealous Wife*, a comedy, produced at Drury Lane in 1761. *The Clandestine Marriage*, written in collaboration with Garrick, followed in 1766, and he afterwards wrote or adapted many other plays. He managed Covent Garden Theatre from 1767 to 1774, and the Haymarket from 1776 to 1789.

Colman, George ('the Younger') (1762-1836), English dramatist, son of the preceding. Of his many dramas the most successful were: *The Heir-at-Law* (1797); *The Poor Gentleman* (1802); *John Bull, or An Englishman's Fireside* (1803); and *Love Laughs at Locksmiths* (1803).

Colmar, a city in Upper Alsace, on the

Lauch. It has manufactures of printed goods, calicoes, and silks, besides cotton-mills, ironworks, and tanneries. Pop. 42,255.

Colne, a borough of England, county of Lancashire. The chief manufactures are cotton goods. Pop. (1931), 23,790.

Colne, a small river in the West Riding of Yorkshire, a tributary of the Calder.

Colôane, a small island in the Pearl River, China, belonging to the Portuguese colony of Macao (q.v.).

Colocynth, or Bitter-apple, the fruit of *Citrullus Colocynthus*, the dried and powdered pulp of which is used in medicine as an aperient.

Cologne, a city of Rhenish Prussia, on the left bank of the Rhine, forming, in connexion with Deutz, which serves as a bridge-head on the opposite side of the river, a fortress of the first rank. The most important edifice is the cathedral, begun in 1248, but only completed in the nineteenth century, one of the finest and largest Gothic structures in Europe. There are many other beautiful and imposing buildings. The manufactures include sugar, tobacco, glue, carpets, leather, machinery, chemicals, pianos, and the celebrated *eau de Cologne*. The trade by river and railway is very great. It is now the terminus of the daily air mail from Britain. Cologne was one of the most powerful and wealthy cities of the Hanseatic League. In 1792 it ceased to be a free city. Pop. (1925), 700,222.

Colombes, a town of France, practically a suburb of Paris. It has a large stadium where international games and athletic meetings are held. Pop. 22,862.

Colombia, a South American republic, connected with Central America by the Isthmus of Panama, and having a coastline of 1109 miles divided between the Pacific and the Caribbean. It is bounded on the south by Ecuador (boundaries fixed 1916) and Peru (boundaries dispute in progress), and on the east by Brazil (boundaries not defined) and Venezuela (boundaries settlement in 1922). The estimated area is 450,000 sq. miles, and the population is (1928) 7,967,788. The capital is Bogota, and the chief commercial towns are Baranquilla, Manizales, Cartagena, the great Caribbean port, Medellin, the mining centre, and Cucuta, the coffee centre. The north and east of the country are broken into deep valleys

by four mountain chains belonging to the Andes system. The principal valleys are those of the Magdalena and the Cauca, two great rivers, navigable for 900 miles, which unite and flow to the Caribbean. In this region is the volcano Tolima (18,815 feet). The lowlands of the east are practically a continuation of the plains of North Brazil. The climate ranges from the tropical conditions on the coastal regions to the temperate climate in the mountains and in the great central plain of Bogota. This plain and the Cauca Valley are the main agricultural regions. Coffee is grown everywhere, and forms the principal export. Cotton, sugar, and tobacco grow on the Caribbean coast, and cacao on the Pacific coast. Cattle-rearing is extensively carried on, and in every department mining is important. There are 18,000 gold-mines, 12,000 being in Antioquia. Other minerals are copper, lead, cinnabar, manganese, and platinum. There are 32 emerald-mines, practically the only source of world supply. Near Bogota are ironworks, and in the immediate neighbourhood are rich coal deposits. Coal is found in almost every department. The salt-mines of Zipaquirá are a Government monopoly and a source of great revenue. In several places panama hats are made, and there are a few cotton-mills. The principal exports and their approximate value in 1927 were coffee (£18,086,000), platinum (£695,000), bananas (£1,094,000), hides (£695,000), and petroleum (£4,800,000). Total exports in 1927 were £21,800,000, and imports £25,153,000. There are about 1740 miles of railway track (partly British owned). The main roads are being rapidly improved; there are numerous cart tracks, and the inland navigation system is well developed, especially on the Magdalena. Colombia offers great scope for development, particularly in mining and in the exploitation of petroleum deposits and of the great and valuable virgin forests. The state, formerly known as New Granada, broke from Spain in 1819. It was not till 1886, however, that the present Constitution was adopted. In 1903 Panama was formed into a separate republic, which was recognized by Colombia in a treaty with the United States signed in 1914 and ratified in 1921. By this Colombia received £5,000,000 and certain rights in the Canal Zone. The government is in the hands of

a President, a Senate, and a House of Representatives. The State religion is Roman Catholicism. Primary education is free but not compulsory, and there are numerous trade, secondary, and art schools, besides several universities and a school of mining at Medellín. The monetary standard is the gold *peso*, equal to one-fifth of a pound sterling.—BIBLIOGRAPHY: P. L. Bell, *Colombia: a Commercial and Industrial Handbook*; P. J. Eden, *Colombia*; Sir Clements Markham, *The Conquest of New Granada*.

Colombo, a seaport-town, the capital of Ceylon, on the south-west coast. It has a magnificent artificial harbour suitable for the largest vessels, and is a great trading centre and coaling-station. There are dry docks and all repair facilities. The town well merits the name 'The Garden City of the East'. The chief exports are rubber, coffee, tea, tobacco, coco-nuts, coir, vegetable oils, plumbago, &c. Pop. 244,163.

Colon, a free port of Panama, on Manzanillo Island, on the north side of the Isthmus of Panama, at the Atlantic extremity of the interoceanic railway, and near that of the Panama Canal. Once a fever-stricken place, it has become a clean and comparatively healthy town with a large transit trade. There is extensive harbour accommodation. Pop. estimated at 26,000.

Colonel, the commander of a regiment, whether of horse, foot, or artillery. In the British service the rank of colonel is honorary, except in the artillery, engineers, and staff. The actual commander of the battalion is the lieutenant-colonel. In 1920 the title of brigadier-general was abolished; officers in command of a brigade were known as 'colonels commandant', while those occupying an equivalent position on the staff were known as 'colonels on the staff'. The title 'brigadier' superseded these terms in 1928.

Colonia, a department of Uruguay, on the Rio de la Plata below the River Uruguay. It is barren in the uplands, but the valleys and plains are very fertile. Area, 2193 sq. miles; pop. 93,658. The capital, *Colonia*, is a port on the River Plate, with accommodation for ships of 1000 tons.

Colonna, Vittoria (1490–1547), Italian poet. All her poems were devoted to the memory of her husband, the Marquis de Pescara, who died of wounds received at

the battle of Pavia (1525). Michelangelo addressed some of his finest sonnets to her. Her most celebrated work is the *Rime Spirituali* (1538).

Colonna, Cape, the southern extremity of Attica, Greece. Its summit is crowned by the ruins of a temple of Athena.

Colonsay and Oronsay, two islands off the west coast of Argyll, Scotland, united at low water, and at high water only about 100 yards apart; united length, about 12 miles; breadth, varying from 1 to 3 miles. The inhabitants are engaged in fishing and rearing cattle and sheep. Pop. (1931), 238.

Colony, a settlement founded in some foreign country which thereby comes under the sovereignty of the land from which the settlers came. Originally the name was applied to a settlement in a conquered country, and in modern times it is frequently used for a district of a large city which is inhabited by subjects of some foreign nation (Italian Colony, French Colony, &c.). Generally speaking, the colonies of any particular country are taken to be all that country's foreign possessions. The colonies of the Phœnician and the Greek cities were simply new settlements founded by the superabundant or discontented population. These settlements had no political connexion with the mother-city, except where commerce was the main incentive to foundation. Athens was the first city to adopt complete control of her outlying possessions, and the settlements which she planted in dependent territories were colonies in the real sense of the word. The Romans under the Republic developed this scheme of colonial dependencies, and Carthage was also a great colonizing power. In the Middle Ages Genoa and Venice had commercial colonies in all parts of the Mediterranean. The great era of colonization started with the discovery of America and the doubling of the Cape, for the knowledge that there were new lands beyond the seas induced men who desired wealth and adventure to set out in search of fortune, and also offered the prospect of a haven to those who were discontented with the political, economic, or religious situation in their native land. Missionary zeal also prompted the foundation of many colonies. The *Portuguese* were the first great modern colonizers. They discovered Madeira, the Azores, and the Cape Verde Islands in

1419; the Congo and the Cape followed; and in a few years they were established at Calicut on the Malabar coast. Brazil was settled about 1530, but was ultimately lost. The Portuguese colonies have now an area of 936,264 sq. miles, and comprise Goa, Diu, and Damao in India; Macao in China; Timor in the Malay Archipelago; and Portuguese Guinea, Angola, Portuguese East Africa, and the Cape Verde and other islands in Africa. Soon after the Portuguese the *Spaniards* commenced the work of colonization. They colonized vast tracts of land in Central and South America, but they never really developed them. The pursuit of mining for gold and silver occupied the colonists almost exclusively. The colonial intercourse with Spain was confined to the single port of Seville, afterwards to that of Cadiz, from which two squadrons started annually—the *galleyons* for Porto Bello; and the *fleet* for Vera Cruz. When the power of Spain declined, the colonies declared their independence. All the Spanish colonial possessions are now in Africa, and comprise Spanish Guinea (Rio Muni, Fernando Po, Annobon, &c.), Rio de Oro and part of Morocco, with a total area of 129,470 sq. miles. The *Dutch* colonial power grew rapidly. In 1602 the Dutch East India Company was formed with a monopoly of the East India trade. The Dutch now deprived Portugal of almost all her East Indian territories, settled a colony at the Cape (1650), and made settlements in the West Indies and in Brazil. The growth of Britain and the adversities suffered by the Netherlands during the Napoleonic wars seriously injured the colonial power of the nation. The Dutch colonies now comprise the majority of the East Indies, several of the West Indies, and Dutch Guiana, with a total area of 788,336 sq. miles. The *French* colonized certain West Indian islands between 1627 and 1636, and Quebec was founded in 1608. In 1670 Pondicherry was settled and became the capital of extensive East Indian possessions. France prospered exceedingly in the West Indies, in Canada, and in India, but ere long the rival interests of British and French colonists brought about conflicts from which Britain emerged victorious. The chief French colonial possessions now are Pondicherry and a few other places in India; French Indo-China; Morocco, Algeria, Tunisia, Sahara, Sene-

gambia, Guinea, French West Africa, French Equatorial Africa, French Somaliland, Madagascar, Réunion, &c., in Africa; certain West Indian islands and French Guiana in America; and certain Pacific islands. The total area is 5,383,035 sq. miles. *Italy* has Eritrea, Italian Somaliland and Tripolitania and Cyrenaica (Libia); *Denmark* has Greenland; and *Belgium* the Belgian Congo. To the *U.S.A.* belong the Virgin Islands, the Samoan Islands, Guam, and the Philippines. The efforts of *Germany* at colonization were never successful, and at the conclusion of the European War she was deprived of all her colonies, which, along with certain Turkish territories, were delivered under mandates from the League of Nations to various Allied Powers: Britain got Iraq, Palestine, Trans-Jordan, New Guinea, Samoa (W.), Nauru, S.W. Africa, and parts of Togo and Cameroon; France was given Syria and Lebanon, and the rest of Togo and Cameroon; while Japan was appointed mandatory of certain Pacific islands. *Great Britain* is undoubtedly the greatest colonizing power that ever existed. In 1591 English ships reached the East Indies by the Cape route, and in 1600 the East India Company was founded. For more than a century Britain had comparatively small interest in India, but in 1707 commenced the struggle with the French which practically ended with Clive's victory at Plassey in 1757. A century later nearly the whole of India was under the government of the Company, but after the Mutiny it was transferred to the Crown. In America, Virginia was colonized in 1607, and New England by the Pilgrim Fathers in 1620. The colonization of New Hampshire, Maine, New Jersey, Connecticut, and Rhode Island soon followed, and in 1664 the Dutch were driven from what is now New York. Pennsylvania was settled by Quakers in 1682, Maryland in 1631, Carolina in 1670, and Georgia in 1732. Colonies were already established in Bermuda and in many of the West Indies, and Newfoundland (annexed in 1583) was settled in 1621 and 1633. Canada (q.v.) was surrendered to Britain in 1763. (For history of American Colonies, see *United States*.) Australia was discovered in the beginning of the seventeenth century, and New South Wales was established as a

penal settlement in 1788; Tasmania followed in 1803; Western Australia (at first a penal settlement) became a free colony in 1829; Victoria was colonized in 1835, and became independent in 1851; and South Australia was settled in 1836. Queensland became a separate colony in 1859, and New Zealand was settled in 1839 and made a colony in 1840. The annexation of the Fiji Islands took place in 1874, and of part of New Guinea in 1884. In South Africa, Cape Colony, first settled by the Dutch in 1652, became a British colony in 1815. Natal followed in 1843, Bechuanaland in 1885, Zululand in 1887, Rhodesia in 1888-1889, and Orange Free State and Transvaal in 1900. In West Africa the first station on the Gold Coast was founded in 1618, and Gold Coast, Gambia, and Sierra Leone are all ancient possessions of the British Crown. Lagos and Nigeria have been acquired since 1885. Other notable African colonies are Kenya, Uganda, and Somaliland. Gibraltar was conquered in 1704, Malta in 1800, Cyprus, after having been administered by Britain since 1878, was annexed in 1914, and Hong Kong was ceded in 1860. The total area of the British Empire is estimated at 12,279,277 sq. miles, while mandated territories have an additional area of c. 983,762 sq. miles. The self-governing *Dominions* of the British Empire are independent states coequal within the Empire with the United Kingdom. This complete independence and autonomy, which had in practice been recognized and observed for many years, was put in legal form by the Statute of Westminster which was passed by the Parliament of the United Kingdom in 1931. The *Dominions* are Canada, Australia, New Zealand, South Africa, Newfoundland, and the Irish Free State. They are all members of the League of Nations. The other overseas territories of the British Empire may be arranged under several heads, according to their relations with the Crown: (1) *India* (q.v.), which, being destined to become a dominion, already has certain dominion privileges. The British Government, however, retains direct control of the executive, and the Viceroy has certain powers regarding essential legislation. (2) *Colonies possessing responsible government* (Malta and Rhodesia). In these the British Government has only a veto on legislation

and controls no official but the Governor.

(3) *Colonies possessing representative government* (Bermuda, Bahamas, &c.). In these the Crown has more power over legislation and retains control of the public offices.

(4) *Crown Colonies*, in which the legislature is controlled by an executive containing a majority of Crown officials. This is necessary where there is a large native population unfit for political activity. Official representation is decreased as the political education of the natives progresses. (5) *Protectorates*, such as Somaliland, which differ from Crown colonies in that the inhabitants are not British subjects and that the territory does not belong to the Crown. See *Protectorate*. (6) *Protected States* (Sarawak), which preserve their legal identity, British officials acting in the name of the rulers of the various countries. (7) *Mandated Territories* (q.v.). (8) *Spheres of Influence*. See *Protectorate*.

The British colonies are administered through the Colonial Office with its various departments (Near East, &c.). For Dominions affairs there is the Dominions Office (founded 1925). See *Imperial Conference*. — BIBLIOGRAPHY: *The Colonial Office List*; A. W. Jose, *The Growth of the Empire*; P. S. Reinsch, *Colonial Administration*.

Colophon, an ancient Ionian city of Asia Minor, about 8 miles north of Ephesus.

Colorado, one of the United States of America, situated in the central belt of states in the Rocky Mountains; area, 103,948 sq. miles. The western and central portions of its area are occupied by an intricate plexus of wild and irregular ranges enclosing valleys known as 'parks', most of which are fertile, well wooded, and of a mild climate. A large number of the mountains are over 14,000 feet high, including Pike's Peak, Long's Peak, and others. The east of the state is a vast plain well adapted for pasture. The rivers include the Arkansas, South Platte, Grand River, &c., many of them remarkable for the grandeur of their cañons. There are extensive forests. Of the arable lands in the state a great portion require irrigation. The climate is dry and healthy. The chief wealth of Colorado consists of its minerals, principally gold and silver. Iron is widely diffused, and coal is mined to the extent of 12,000,000 tons a year. There are nearly 6000 miles of railways. The public school system is good, and there are two

universities. Colorado was organized as a territory in 1861, and admitted as a state in 1876. The state capital is Denver. Pueblo and Colorado Springs are next in importance. Pop. of the state, 939,629.—Cf. W. F. Stone, *History of Colorado*.

Colorado, a name of two rivers of the U.S.A.—(1) The Western Colorado, or Rio Colorado, formed by the junction of the Green and Grand Rivers in Utah. It flows through Arizona, and between Arizona and Nevada and California, and, after a total course of about 1200 miles, falls into the Gulf of California. Among the most wonderful natural objects in North America is the Big Cañon of the Colorado, where the river flows between vertical walls of rock often 6000 feet high. (2) A river in Texas which, after a course of about 900 miles, falls into the Gulf of Mexico.

Colorado Beetle, an American beetle about half an inch long found in the Rocky Mountains. Its body is yellow with black markings, and its wings are red. It does great damage to potato crops.

Colorado Springs, a city of the U.S.A., in Colorado, near the centre of the state. It is a railway centre and health-resort, the seat of Colorado College, has mineral springs, and there are gold and other mines in the neighbourhood. Pop. 30,105.

Colossæ, an ancient city of Asia Minor, in Phrygia, on the Lycus, a branch of the Mæander.

Colosseum, or **Coliseum**, a name given to the Flavian Amphitheatre in Rome, a large building for gladiatorial shows, fights of wild beasts, and similar sports. It was begun by Vespasian A.D. 72, and finished by Titus A.D. 80. The outline of the Colosseum is elliptic, the exterior length of the building being 620, its breadth 525, and its height 157 feet. The Colosseum could contain 45,000, or, according to some, 87,000 spectators.

Colossians, *Epistle to the*, one of the four captivity epistles written to the Colossians by the Apostle Paul from Rome, at the same time that he wrote the epistles to the Ephesians, Philemon, and the Philippians. The epistle contains a summary of Christian doctrine, especially dwelling on the divine power and majesty of Christ, and a series of practical exhortations to specific duties of Christian morality.

Colossus, in sculpture, a statue or enormous magnitude. The Asiatics, the Egyptians, and in particular the Greeks, have excelled in these works. The most celebrated Egyptian colossus was the vocal statue of Memnon in the Plain of Thebes. Among the colossi of Greece the most celebrated was the colossus of Rhodes, erected 290 or 288 B.C. It was thrown down by an earthquake about 224 B.C. There is no authority for the statement (popularized by Shakespeare, *Julius Caesar*, i, 2, 136, and by Swift, *A Voyage to Lilliput*, Chapter III) that it bestrode the harbour mouth, and that the Rhodian vessels could pass under its legs. Among the colossi of Phidias were the *Olympian Zeus* and the *Athena* of the Parthenon; the former 60 feet high and the latter 40. The most famous of the Roman colossi were the *Jupiter* of the Capitol, the *Apollo* of the Palatine Library, and the statue of Nero, 110 or 120 feet high.

Among modern works of this nature are the statue of Hermann or Arminius near Detmold, erected in 1875, 90 feet in height to the point of the upraised sword, which itself is 24 feet in length; the statue of *Germania*, erected in 1883 near Rüdeshheim, a figure 34 feet high; and Bartholdi's statue of *Liberty*, presented to the United States by the French nation, which measures 104 feet, or to the extremity of the torch in the hand of the figure, 138 feet.

Colour is the name given to distinguish the various sensations with which light of various rates of vibration affects the eye. The word is also used to denote the property of bodies that causes them to emit the light that thus affects our senses.

Ordinary white light (the light which comes from an incandescent solid or liquid) when transmitted through triangular prisms of glass or other media spreads out into a coloured band or spectrum. We infer that ordinary light, the light which when it enters the eye produces the sensation of white light, is really compounded of light of many different colours. (See *Dispersion*, *Spectrum*, and *Light*.) The colours thus shown are usually said to be seven—red, orange, yellow, green, blue, indigo, violet; although in reality there is an enormous, if not an infinite, number of perfectly distinct colours in light. The seven colours

are frequently called the primary colours, and other tints and shades are producible by mixing them; but in a stricter sense the primary colours are three in number, namely, red, green, and blue-violet. These three colours or kinds of light cannot be resolved into any others. On the other hand, when they are mixed in right proportions they produce white light. Further, the combination of any two gives the complementary colour to the third, e.g. red and green light when mixed produce yellow, which is complementary to blue-violet. If a body absorbs every other kind of light and reflects or transmits red light only, it will appear of a red colour; if it absorbs every kind except blue rays, it will appear blue; and so on.

The properties of the colours of the spectrum have to be distinguished from the properties of colours in the sense of *pigments*. The pigments red, blue, and yellow, regarded in the arts as the primary colours, produce effects, when mixed, very different from those produced by admixture of the corresponding spectrum colours. These three pigment colours form other colours thus: red and yellow make orange, yellow and blue make green, and red and blue make purple; but red, blue, and yellow cannot be produced by any combination of the other colours. The three-colour theory has important applications in the arts, namely, in colour photography and in the photo-mechanical process of printing in three colours. See *Dyeing; Paints and Pigments; Process Work*.—BIBLIOGRAPHY: Sir W. de W. Abney, *Colour Vision and Trichromatic Theory*; L. C. Martin, *Colour and Methods of Colour Reproduction*; F. R. Newens, *The Technique of Colour Photography*.

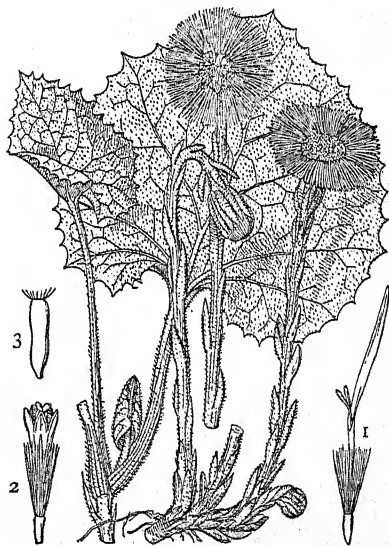
Colour-blindness, total or partial incapability of distinguishing colours. It may vary from inability to discern any colour to inability to distinguish between the primary colours. Red is the most common colour to be indistinguishable to the colour-blind. The disease may exist in eyes otherwise functioning properly, and its cause is nearly always to be found in the sensorium.

Colour Printing. See *Process Work*.

Colours, Military, the military emblem or banner of infantry. 'The colours' consist of two silken banners known as the 'king's' and 'the regimental' colour;

on the latter, which is of the colour of the regimental facings, are embroidered on both sides the regimental devices and badge, and the battle honours authorized to be borne by that regiment. Formerly colours were always carried in action, but since 1879 British regiments have left their colours at home before proceeding overseas. The colours are invariably carried by two subalterns, accompanied by three senior non-commissioned officers. Rifle regiments have no colours. See *Flags*.

Colour-sergeant, formerly a non-commissioned officer who attended the colours on parade or near head-quarters. He was the senior non-commissioned officer of his company, and had many administrative duties. The rank was created in the British army in 1813. Since the introduction of the double-company system in 1914, the rank of colour-sergeant has been done away with; the duties are now performed by the company sergeant-major and company quartermaster-sergeant.



Colt's-foot (*Tussilago Farfara*)

1, Ray floret. 2, Disk floret. 3, Fruit.

Colt's-foot (*Tussilago Farfara*), a British plant of the order Compositæ, the leaves of which are sometimes used as a

remedy for asthma and coughs. The flowers are yellow, and appear very early in spring.

Columba, St. (521-597), Irish saint. In 545 he founded the monastery of Derry, and subsequently established many churches in Ireland. About 563 he landed in the Island of Hy, now called Iona, and founded his Church. About 565 he traversed the whole of Northern Scotland preaching the Christian faith and founding monasteries, all of which he made subject to that of Hy.—Cf. W. D. Simpson, *The Historical Saint Columba*.

Columban, Saint (543-615), Irish saint. He founded the monasteries of Annegray, Luxeuil (590), and Fontaine in Burgundy. His rule was much more severe than the Benedictine rule, and punished the smallest offences of the monks with stripes. He appears to have remained at Luxeuil for nearly twenty years. He then went among the heathen Alemanni, and preached Christianity in Switzerland. About 612 he passed into Lombardy, and founded the monastery of Bobbio, in which he died.

Columbia, the capital of South Carolina, U.S.A., on the left bank of the Congaree. It has cotton-mills, foundries, and manufactures of fertilizers and hosiery. There are two universities, one for negroes. Pop. 37,524.

Columbia, a city of the U.S.A., in Pennsylvania, on the Susquehanna, a great mart for lumber. It is an active port, and has numerous manufactures. Pop. 11,454.

Columbia, District of, a tract of country in the U.S.A., on the Potomac, surrounded on three sides by Maryland, forming a neutral district for the seat of national government. It has an area of 70 sq. miles, and a pop. of 437,571. A portion of the District of Columbia is known as the city of Washington, which has been the national capital since 1800. Since 1878 the affairs of the District and of Washington have been administered by three commissioners directly under Congress.

Columbia River, or **Oregon**, a river in North America, flowing into the Pacific Ocean, and rising at the base of the Rocky Mountains in British Columbia. The depth in Bar Channel at low water is 42 feet, and thus the largest steamers can ascend to Portland (q.v.) and other ports.

It drains an area of 298,000 sq. miles, and has a length of about 1400 miles.

Columbine, the popular name of plants of the genus *Aquilegia*, order Ranunculaceæ, with five coloured sepals and five spurred petals. The common columbine (*A. vulgaris*) is a favourite garden flower.

Columbite, a mineral tantalate and niobate of iron and manganese (FeMn)(NbTa)₂O₆. It is black and heavy, and occurs in granitoid rocks or their alluvial sands; it with its ally tantalite is the chief source of tantalum.

Columbium. See *Niobium*.

Columbus, Christopher (1451-1506), Genoese navigator. He appears to have gone to sea at an early age and to have navigated all parts of the Mediterranean and some of the coasts beyond the Straits of Gibraltar. He gradually came to the conclusion that there was a shorter route to India by the west. After many disappointments he induced Ferdinand and Isabella of Spain to equip and man three vessels for a voyage of discovery. It was early in the morning of Friday, the 3rd of Aug., 1492, that Columbus set sail from the port of Palos. On the 12th Oct., 1492, the Island of Guanahani or San Salvador was sighted. He then sailed in search of other lands, and discovered Cuba, St. Domingo, and some other of the West Indian Islands. Being so far successful, he built a fort at Hispaniola, Haiti, left some of his men there, and set out on his return to Europe, where he was received with almost royal honours. In 1493 he set out on his second great voyage from Cadiz, with three large ships of heavy burden and fourteen caravels, carrying 1500 men. He discovered the Island of Dominica, and afterwards Mariegalante, Guadeloupe, and Porto Rico, and at length arrived at Hispaniola. Dissatisfaction among his companions and news of calumnies being set on foot against him at home induced him to return to Spain, where his presence, and probably also the treasure he brought, silenced his enemies. In May, 1498, he sailed with six vessels on his third voyage. Three of his vessels he sent direct to Hispaniola; with the three others he took a more southerly direction, and having discovered Trinidad and the continent of America, returned to Hispaniola. His enemies, in the meantime, endeavoured to convince his sovereigns that his plan was

to make himself independent, and Columbus was not only displaced, but Francisco de Bobadilla, a new governor who had come from Spain, even sent him to that country in chains. On his arrival (in 1500) orders were sent directing him to be set at liberty and inviting him to Court, but for this injurious treatment he never got redress, though great promises were made. After some time he was able to set out on his fourth and last voyage (1502) in four small vessels supplied by the Court. He encountered every imaginable disaster from storms and shipwreck, and returned to Spain, sick and exhausted, in 1504. He died two years later.—BIBLIOGRAPHY: Washington Irving, *History of the Life and Voyages of Christopher Columbus*; J. Winsor, *Christopher Columbus*; Charles J. Elton, *Career of Columbus*; Filson Young, *Christopher Columbus and the New World of his Discovery*.

Columbus, a city of the U.S.A., the capital of Ohio, near the centre of the state. Educational institutions include the State university and several medical schools. There is a very extensive trade, and the manufactures include margarine, wagons, carriages, and machinery. Pop. 261,082.

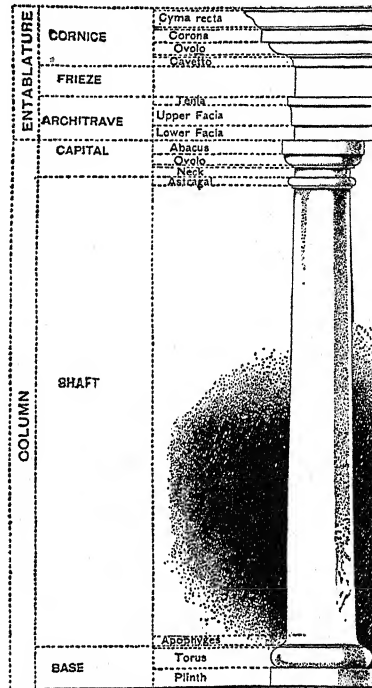
Columbus, a city in the U.S.A., in Georgia, on the Chattahoochee River, with cotton manufactures, and refineries, foundries, and flour-mills. Pop. 31,125.

Columbus, a city of the U.S.A., in Indiana, not far from the centre of the state. It is in an agricultural district, and is an important railway centre. Pop. 8813.

Columella, Lucius Junius Moderatus (first century A.D.), Roman writer on agriculture. His work on agriculture (*De Re Rustica*) in twelve books is still extant.

Column, in architecture, a round pillar, a cylindrical solid body set upright and primarily intended to support some superincumbent weight. A column has as its most essential portion a long solid body, called a *shaft*, set vertically on a *stylobate*, or on a congeries of mouldings which forms its *base*, the shaft being surmounted by a more or less bulky mass which forms its *capital*. In classical architecture columns have commonly to support an *entablature* consisting of three divisions, the *architrave*, *frieze*, and *cornice*, adorned with mouldings, &c. Columns are distinguished by the names of the styles of architecture to which they belong; thus there are

Hindu, Egyptian, Grecian, Roman, and Gothic columns. In classic architecture they are further distinguished by the name of the order to which they belong, as Doric, Ionic, Corinthian, Composite or Tuscan.



Column (Tuscan Order)

Colvin, Sir Sidney (1845–1927), English man of letters. He was Slade professor of fine art at Cambridge from 1873 to 1885, and Keeper of the Prints and Drawings at the British Museum from 1884 to 1912. His chief publications are *John Keats: his Life and Poetry* (1917), and his edition of the letters of R. L. Stevenson, who was his intimate friend. His autobiographical *Memories and Notes of Persons and Places, 1852–1912*, appeared in 1921.

Colwyn Bay, a watering-place of North Wales, Denbighshire. It is a favourite holiday-resort and is beautifully situated. It has numerous hotels and a long promenade with two piers. The population in 1931 was 20,885.

Colza Oil, an oil expressed from the seeds of a variety of cabbage (*Brassica campestris*), used for lubricating machinery, for burning in lamps, and in the manufacture of soap.

Comacchio, a fortified town, Italy, province of Ferrara, amidst unhealthy marshes, about 2 miles from the Adriatic, with productive fisheries. Pop. 12,052.

Comayagua, a town of Central America, in Honduras, situated about midway between the two oceans. Pop. about 8000.

Combaconum. See *Kumbakonam*.

Combe, Andrew (1797–1847), Scottish physiologist. His chief works are: *Observations on Mental Derangement*, *Principles of Physiology*, *Physiology of Digestion*, and *A Treatise on the Physiological and Moral Management of Infancy*. Like his brother George, he was a zealous phrenologist.

Combe, George (1788–1858), Scottish phrenologist, brother of the foregoing. He was the first to introduce the doctrines of phrenology into Great Britain. Besides writing *The Constitution of Man*, published in 1828, he was the author of *A System of Phrenology* and *The Relation between Science and Religion*.

Combe, or **Coombe**, William (1741–1823), English writer. His chief works are: *The Tour of Dr. Syntax in Search of the Picturesque*, *The History of Johnny Quae Genus*, and the *English Dance of Death*, all accompanied by Rowlandson's prints.

Combermere, Stapleton Stapleton-Cotton, Viscount (1773–1865), English general. He served with distinction through the Peninsular War, and was commander of the allied cavalry after 1810. In 1825 he was appointed Commander-in-Chief in India, and was raised to the rank of viscount in 1826 after he had captured Bhurtpore.

Combes, Justin Louis Émile (1835–1921), French politician. He was Vice-President of the Senate in 1893, Minister of Education in 1895, and succeeded Waldeck-Rousseau as Premier in 1902. It was during his ministry that the final separation (in 1905) of Church and State took place. He resigned in 1905, but was Minister without Portfolio in 1915.

Combretaceæ, an order of shrubby or arborescent polypetalous dicotyledons, tropical shrubs or trees, with leaves destitute of stipules, long slender stamens, and brightly coloured flowers.

Combustion, the union of an inflammable substance with oxygen or some other supporter of combustion, attended with heat and in most instances with light. As the combination of the carbon in fuel with the oxygen of the air is the commonest method of getting heat and light, and as when the action takes place the fuel is said to burn or undergo combustion, the latter term has been extended to those cases in which other bodies than carbon—for example, phosphorus, sulphur, or metals—burn in the air or in other substances than air—for example, chlorine. Though the action between the gas and the more solid material, as coal, wood, charcoal, of whose combination combustion is the result, is mutual, the one having as much to do with the process as the other, yet the former, as oxygen, chlorine, iodine, and the compounds which they form with each other and with nitrogen, have received the name of supporters of combustion, while to the latter the term combustibles has been assigned. Combustion, like other chemical actions, is attended by the release of a definite amount of energy, proportional to the weight of the material consumed. Practically the whole of this energy appears in the form of heat. See *Thermochemistry*.

Comedy, a drama of a light and amusing nature, usually having a happy ending. For some time the happy ending was considered the essential attribute of a comedy. Comedy is usually contrasted with tragedy, these two being the two great divisions of dramatic art, but it may also be contrasted with farce and burlesque. Farce has been defined as inadequately motivated comedy; farces often begin with a postulate which must be granted by the audience, but which is in itself impossible or improbable. Burlesque is mere caricature. Of course, not infrequently plays are neither comedies nor farces, but must be placed in a sort of No Man's Land between the two. See *Drama*.

Comenius, Johann Amos (1592–1670), Moravian educational reformer. He was the author of upwards of ninety works, the most important of which are *Janua Linguarum Reserata* (1631) and *Orbis Sensualium Pictus* (1658).

Comets, certain celestial bodies which appear at irregular intervals, moving through the heavens in paths which seem

to correspond with parabolic curves, or in a few instances in elliptical orbits of great eccentricity. The former disappear into space possibly never to return; the latter return to us periodically. Some comets are visible only by the aid of the telescope, while others can be seen by the naked eye. One of the latter class generally appears like a star with a tail or train of light, sometimes short and sometimes extending over half the sky. The direction in which it points is always opposite to the sun, and as the comet passes its perihelion the tail changes its apparent position with extraordinary velocity. The head of the comet is itself of different degrees of luminosity, there being usually a central core, called the *nucleus*, of greater brilliancy than the surrounding envelope, called the *coma*.

Tycho Brahe (1546-1601) was the first to regard the appearance of comets as other than supernatural and to come to the conclusion that the comet of 1577 was a heavenly body at a greater distance from the earth than that of the moon. Newton's observations on the comet of 1680 led him to conclude that the orbits of the comets must, like those of the planets, be ellipses, having the sun in one focus, but far more eccentric, and having their aphelia far remote in the regions of space. This idea was taken up by Halley, whose study of the twenty-four comets of which record had been kept brought out interesting results, the most important of which was that the comets of 1456, 1531, 1607, and 1682 were reappearances of one and the same comet, which revolved in an elliptic orbit round the sun, performing its circuit in a period varying from a little more than seventy-six years to a little less than seventy-five. Its greatest distance from the sun was calculated as about 3,300,000,000 and its least about 53,000,000 miles. The comet therefore belonged to the solar system, and was quite beyond the appreciable attraction of any body which did not belong to that system, and as this was determined of one comet, analogy pointed to it as probably true of others. In 1835 it again returned; it was last seen in 1910. Its head passed between the sun and earth about 15,000,000 miles from the latter, and it is thought that the tail was separated from the body.

Encke's comet, first discovered in 1818 by Encke to be a periodic comet, was

identified with comets previously seen in 1786, 1795, and 1805, and has been frequently observed since. It revolves round the sun in about $3\frac{1}{2}$ years, having the shortest period of any known comet. *Biela's comet* is one of the most important, and was discovered in 1826, though identified with the one seen in 1772 and 1806. It was again seen in 1832, 1839, 1846, and 1852, but on the last two occasions it was seen cut in two. Since then it has not been seen, the supposition being that it has been dissipated. The immense showers of meteors in 1872 and 1885 have been associated with its disappearance. *Donati's comet* was discovered by Dr. Donati of Florence in 1858, and was seen till the following year.

The paths in which comets move are not nearly in the same plane as the orbit of the earth. Leaving out the asteroids or minor planets, the orbits of all the others except the smallest, Mercury, whose inclination is 7° , are contained within a zone extending only $3\frac{1}{2}^\circ$ on each side of the ecliptic, or plane of the earth's orbit. But the orbits of the comets are at all possible angles. About three-fourths of all the comets that have been observed have their perihelia at a less distance than the earth's. Twelve approached the sun within 5,000,000 miles, those of 1843 and 1882 passing within 100,000 miles of the sun's surface. Only eleven have had a perihelion distance exceeding twice the earth's mean distance, while one only, that of 1729, had one of four times.

There are many comets comprising comet 'families', which appear to have relation to the larger and distant planets. Those with periods ranging from three to eight years have all a point at which their orbits pass close to Jupiter's, and their paths are supposed to be governed by his attraction. Others are similarly related to Saturn, Uranus, and Neptune, the six Neptune comets having periods of about seventy-five years. Halley's famous comet is one of these six. There also seem to be other families of still greater periods, possibly bearing a similar relationship to more remote and as yet undiscovered planets. Another theory of the connexion with the respective planets is that these comets were ejected from the planets at remote epochs in the past, when the planets were in a sun-like state. In addition to the comet families

mentioned already as related to particular planets there are comet 'groups', each consisting of a number apparently related to each other, as they revolve in almost precisely coincident paths. Thus the comets of 1668, 1843, 1880, and 1882 had almost identical orbits, but in the cases at any rate of the last three they were certainly different comets, as they all had evidently long periods.

Though comets are bodies of extreme tenuity of constitution they are of colossal dimensions; in some cases they greatly exceed the sun himself in bulk. In most cases the coma or head is larger than the earth. The tail of a conspicuous comet is usually as much as 10,000,000 miles long, and may be ten times that length. As it commonly expands towards the extremity, its volume may often exceed enormously the sun's. The tail in general becomes larger with approach to the sun, and shortens or totally vanishes as the comet recedes.

The spectroscope shows that comets shine partly by reflected sunlight, but are also self-luminous, especially when near the sun. The materials indicated comprise compounds of carbon, such as hydrocarbons and cyanogen, and metals, e.g. sodium, and, in one case at least, iron. The orbits of some comets are identical with the orbits of particular showers of shooting-stars.—Cf. G. F. Chambers, *The Story of the Comets*.

Comfrey, a name given to several European and Asiatic plants of the genus *Symphytum*, nat. ord. Boraginaceæ. The common comfrey, *S. officinale*, is found in Britain on the banks of rivers and ditches.

Comiso, a town of Sicily, province of Syracuse. Pottery, soap, and cotton are manufactured. Pop. 26,624.

Comitia, with the Romans, the assemblies of the people in which such public business was transacted as the election of magistrates, the passing of laws, &c. These were of three kinds: (1) The *comitia curiata*, or assemblies of the patrician houses or *populus* in wards or *curiæ*. (2) The *comitia centuriata*, or assemblies of the whole Roman people, including patricians, clients, and plebeians in divisions called *centuries*. The functions of the *curiata* were almost confined to the election of priests, and the confirmation of dignities imposed by the people. The

centuriata had the power of electing consuls, deciding on war, and accepting or rejecting laws. (3) The *comitia tributa*, or assemblies of the plebeian tribes only. The *tributa* in the later days of the republic elected the inferior magistrates, &c.

Commander, a chief; the chief officer of an army or any division of it. The office of *commander-in-chief* (abolished 1904) used to be the highest staff appointment in the British army. In the navy, a commander holds a definite rank above lieutenant and under captain. He ranks with a lieutenant-colonel in the army.

Commelinaceæ, a large natural order of monocotyledons, mostly tropical and sub-tropical herbs, the best-known genus of which is *Tradescantia*.

Commensalism, mutualism, association of two organisms as messmates (mutualists), to the benefit of one or both. There are many examples of this. A well-known one is that of hermit crabs, which carry about attached anemones or sponges, the noxious properties of which serve as a protection, while the passive partner has an increased chance of securing food.

Commentry, a town of France, department of Allier, in the midst of a small coal-field. Pop. 10,112.

Commerce, the term now applied to the international exchange of goods as distinct from internal trade. Its character, extent, direction, &c., are determined primarily by geographical position and transport facilities. Thus districts around navigable rivers, towns in central positions as regards railways and roads, and countries with good harbours have always been commercially important. Of course such considerations as internal politics, international relationships, and security of trade routes are also of great importance, while expedition in the working of cargo, speedy distribution of goods from the ports, and facilities and freedom of exchange must be taken into account. The growth of commerce has been closely united to the increase of sea-power. The rise and decay of commerce in Carthage, Portugal, Spain, and Holland almost coincided with the possession and loss of maritime supremacy. The importance of ocean-borne traffic has increased tremendously, though international trade by river and canal tends (as in the continent of Europe) to decline with the develop-

ment of railways. Nowadays regular cargo liners are replacing tramp steamers on the main trade routes. A large part of the world's carrying trade is done by British vessels. In the nineteenth century an elaborate financial system, based on the bill of exchange, grew up for the purpose of facilitating transactions between merchants in different countries. This collapsed during the European War, with disastrous results to Central European commerce. The primary aim of commerce is, of course, the exchange of goods in excess of a country's requirements for those in which it is deficient. At the present time international trade is regulated by two main ideas: (1) that the aim of commerce is to enable countries to specialize in those goods which they can produce most easily and cheaply, and thus to assist the growth of the wealth and productive power of the world and of individual countries; and (2) that the conservation and development of all the natural resources of a country increases national welfare in the long run by increasing national security and independence. See *Foreign Trade*.—**BIBLIOGRAPHY:** W. and A. K. Johnston, *The Modern Atlas of Commerce* (with handbook); J. Fairgrieve and E. Young, *Gateways of Commerce*; W. E. Webster, *A General History of Commerce*.

Commerce, Chamber of, a board chosen from among the merchants and traders of a city to protect the interests of commerce; to lay before the legislature the views of their members on matters affecting commerce; to furnish statistics as to the staple trade of the locality; and to attain by combination advantages which could not be reached by private enterprise, to advance and promote commercial and technical education, &c. The first in Britain was that of Glasgow (1783); now all the great towns in almost every country have their chamber.

Commercial Court, that court which is for the time being presided over by a judge of the King's Bench Division who has special familiarity with commercial business, and to whom commercial causes have been assigned. The court was established in London in 1895. Sir J. C. Mathew was the first judge, and to him is due much of the credit of planning and establishing the court. Cases are not of necessity tried in this court, but are assigned to it

on application made by either party and granted by the judge, and of the cases assigned to it few are tried by jury.

Commercial Law, or Law Merchant, is derived from the law of mediæval Europe, the imperial code of Rome, and the custom of merchants. To the judgments of Lord Mansfield we owe the absorption of the law merchant into the common law of England, and a distinguished authority was Professor Leone Levi, whose *Commercial Law of the World* led to the passing of the Acts 19 and 20 Vict. c. 60 and 97, whereby the mercantile laws of the United Kingdom were made uniform in many points. The Bills of Exchange Act, 1882, an act to codify the law relating to Bills of Exchange, cheques, and Promissory Notes, has been enacted in New Zealand, Victoria, New South Wales, South Australia, Queensland, Tasmania, and with alterations by Canada.

Commercial Terms.

Account Current.—A periodical statement of the debit and credit transactions between parties in order of date.

Account Sales.—A statement sent by an agent to a consignor of goods when sold, giving particulars of weight, price obtained, &c., and showing the net proceeds after deduction of expenses.

Ad valorem Duty.—Duty levied in proportion to the value of the article imported.

Affidavit.—A declaration in writing upon oath.

Amortization.—The extinction or reduction of a debt by means of a sinking fund.

Audit.—An examination into accounts by proper officers appointed for that purpose.

Bank Rate.—The rate per cent charged by the Bank of England for discounting bills.

Bear.—A person who sells stocks or shares that he does not possess at the time of selling them, but which he hopes to buy at a lower price before the time fixed for making the delivery.

Bill of Exchange.—An unconditional order in writing addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand or at a fixed or determinable future time a certain sum in money to or to the order of a specified person or bearer.

Bill of Lading.—A receipt given by the master of a vessel for goods shipped on board his vessel.

Bill of Sale.—A document by which a person transfers his interest in goods and chattels to another.

Bill of Sight.—A custom-house entry enabling the importer to inspect goods before they are officially accepted.

Bona fide.—In good faith.

Bonded Goods.—Goods deposited in a bonded warehouse until the duties chargeable thereon are paid.

Bull.—One who purchases stock for future delivery, hoping to sell at a higher price before the time of settlement.

Charter Party.—A contract between a merchant and a shipowner.

Circular Note.—A note or bill issued by bankers for the convenience of customers travelling abroad.

Demurrage.—(1) The compensation paid to the owner of a ship for its detention by the charterer beyond the number of days allowed for loading and

unloading; (2) a charge made by railway companies for detention of trucks, wagons, &c.

Docket.—To mark on the backs of letters or other documents a summary of their contents.

Draft.—A written order for the payment of a sum of money addressed to some person who holds money in trust, or who acts in the capacity of agent of the drawer.

Earnest Money.—Money paid to bind a bargain.

Ex officio.—A term denoting the power a person possesses by virtue of his office.

Indent.—An order received from a foreign correspondent.

In transitu.—In course of transmission: on the way.

Lien.—The right of a creditor to retain the property of a debtor till the debt is paid.

Limited Liability Company.—A company whose members or shareholders are liable to the extent only of the amount of the shares for which they have subscribed.

Par.—The original amount at which stocks or shares were issued. When this price rises, they are said to be at a *premium*; when the price falls below the original amount, they are said to be at a *discount*.

Per pro.—*Per procurationem.*—A document by which a person is empowered to transact the affairs of another.

Post-date.—To mark (a document) with a date which is later than the day on which the document is written. A post-dated cheque or invoice does not become operative until the date marked on it.

Price of Money.—The rate of discount at which money may be borrowed.

Prime Cost.—The first or direct cost of production, before charging on cost or establishment expenses.

Pro forma.—For the sake of form.

Pro rata.—Proportionately.

Put.—In stock exchange speculation an option to deliver, or not deliver, at a future date.

Receipt.—A written acknowledgment of something having been received.

Schedule.—An inventory or catalogue of goods with prices.

Tariff.—The schedule of duties charged on the importation of merchandise into a country.

Underwriter.—In commerce one who transacts the business of marine insurance.

Commercial Treaties, treaties entered into between two countries for the purpose of improving and extending their commercial relations; each country engaging to abolish or to reduce to an agreed rate or otherwise modify the duties on articles of production and manufacture imported from the one country into the other. These treaties also refer to means of transport, to port facilities, and to any other matters likely to affect either signatory. They are usually for a limited period, but may be renewed and modified according to altering conditions. The first treaty of commerce made by England with any foreign nation was entered into with Norway in 1217. The next early English treaties are: with Flanders, 1274 and 1314; Portugal, 1308, 1352, and 1386; Baltic Cities, 1319 and 1388; France, 1471, 1497, and 1510; Florence, 1490. Among

modern treaties the most famous is that negotiated between Richard Cobden and the ministers of Napoleon III in 1860, which resulted in benefits to both nations. Since the European War commercial treaties have become very numerous, and in fact were necessary preliminaries to the resumption of trade between enemy countries.

Commercy, a town, France, department of Meuse, on the Meuse, with iron-works, &c. Pop. 8876.

Communes, Philippe de (c. 1445-c. 1511), French writer and statesman. He became confidential adviser of Charles the Bold, Duke of Burgundy, but passed into the service of Louis XI. After the death of Charles the Bold, Louis took possession of the duchy of Burgundy, sent Communes there, and soon after appointed him Ambassador to Florence. He was afterwards sent by Louis to Savoy. In 1483 Louis XI died, and in 1494 Communes attended Charles VIII in his invasion of Italy, and served him in a diplomatic capacity. Soon after that date he began to write his *Memoirs*, valuable as contributions to the history of his times.

Communes, two towns, one in France, the other in Belgium, on opposite sides of the Lys. In the Middle Ages they formed a single town. Pop. of French Communes, 8210; of Belgian Communes, 6641.

Commissariat, the department of an army charged with the provision of supplies, both forage and food, for the troops. Since 1888 the whole control of transport and supply for the British army has been under the charge of the Royal Army Service Corps.

Commission, in English law, is a writ which issues from a court for various purposes, such as the taking of evidence from witnesses confined by sickness or in foreign parts. In the *army* and *navy* the writing conferring on an officer his command is his commission. In the British army previous to 1st Nov., 1871, these commissions could be purchased.

Commissionaire, one of a body of public messengers in Britain originally selected from the wounded soldiers of the Crimean and Indian Wars. They receive their appointment from a society established by Captain Sir Edward Walter in 1859. In 1920 there were 4880 members of the corps.

Committee. In Parliament, when a

committee consists of the whole members of the body acting in a different capacity from that which usually belongs to them it is called a *committee of the whole House*, the business of which is conducted under somewhat different regulations from those under which the business of the House when not in committee is carried on. Familiar examples of committees of the whole House are *committees of supply* and *committees of ways and means*. *Standing committees* are such as continue during the existence of Parliament. *Select committees* are appointed to consider and report on particular subjects.

Committee of Public Safety (*Comité du Salut Public*), a body elected by the French Convention, 6th April, 1793. It was at first composed of nine, but was increased to twelve members, viz. Robespierre, Danton, Couthon, St.-Just, Prieur, Robert-Lindet, Héroult de Séchelles, Jean-Bon St.-André, Barrère, Carnot, Collot d'Herbois, and Billaud-Varennes. The severe government of this body is known as the Reign of Terror, which ended with the execution of Robespierre and his associates in July, 1794.

Commodore, in the British navy, an officer, generally a captain, holding a temporary commission with a rank between that of captain and admiral, who commands a ship or detachment of ships in the absence of an admiral. The title is also given to the senior captain of a line of merchant vessels, and also to the president of a yachting club.

Commodus, L. Ælius Aurelius (161-192), Roman emperor, son of Marcus Aurelius. Having succeeded his father in 180, he gave early proofs of his cruel and voluptuous character. He used to fight in the circus like a gladiator, and caused himself to be worshipped as Hercules. He was strangled by a favourite athlete.

Common, in English law, "a profit which a man hath in the land of another", such as pasturing horses or cattle in a certain field. These rights, in England, have been mostly determined by immemorial usage. In ordinary language a common is a piece of ground which has no single owner but belongs to a community generally, often unenclosed.

Common Law, the unwritten law, the law that receives its binding force from immemorial usage and universal reception as distinguished from the written or statute

law; sometimes from the civil or canon law; and occasionally from the *lex mercatoria*, or commercial and maritime jurisprudence. It consists of that body of rules, principles, and customs which have been received from former times, and by which courts have been guided in their judicial decisions. Wherever statute law runs counter to common law, the latter is entirely overruled. Since 1873 the jurisdiction of the Court of Chancery as well as that of the Courts of Common Law have been combined in that of the High Court of Justice.

Common Pleas, Court of, formerly one of the three superior courts of common law in England, presided over by a lord chief justice and five (at an earlier period four) puisne judges, had cognizance of all civil causes, real, personal, or mixed, and had both original and appellate jurisdiction. By the Judicature Acts of 1873 and 1875 the jurisdiction of the common pleas was vested in the King's Bench Division of the High Court of Justice.

Common Prayer, Book of, the liturgy or public form of prayer prescribed by the Church of England to be used in all churches and chapels. It dates from the reign of Edward VI; was published in 1549, and again with some changes in 1552. Some slight alterations were made when it was adopted in the reign of Elizabeth. In the reign of James I, and finally soon after the Restoration, it underwent new revisions, with slight changes since. A Revised Prayer Book, supported by the majority of the clergy, was rejected by the House of Commons in 1927 and in 1928.

Commons, House of. See *Britain*.

Common Sense, the philosophy of the so-called Scottish school of philosophy founded by Thomas Reid (1710-1796) (q.v.). He taught that the general consent of mankind as to the existence of an external world is sufficient to establish the reality of a permanent world apart from ourselves. In France the philosophy of common sense was introduced by Royer-Collard (1763-1845). The philosophy of common sense represents one phase of the reaction against the idealism of Berkeley and Hume.

Commonwealth. In English history the name given to the form of government established after the death of Charles I, and which lasted until the Restoration.

Communalism, the theory of govern-

ment which advocates complete local autonomy for towns and other definable communities, the central government being replaced by a federating authority. The theory was adopted by the advanced Republicans of France and elsewhere, especially in 1870. This doctrine has to a large extent been displaced by syndicalism, which contemplates autonomy of trades and occupations.

Commune, a small territorial district in France, being one of the subordinate divisions into which that country is parcelled out; the name is also given to similar divisions in some other countries, as Belgium. In the country a commune sometimes embraces a number of villages, while some large cities are divided into a number of communes.

Commune of Paris. (1) A revolutionary committee which took the place of the municipality of Paris in the French Revolution of 1789, and soon usurped the supreme authority in the State. Among its chiefs were some of the most violent of the demagogues, such as Hébert, Danton, and Robespierre. (2) The name adopted by the ultra-radical party in Paris brought once more into prominence by the events of the Franco-Prussian War, more immediately by the siege of Paris (Oct., 1870, to Jan., 1871). They ruled over Paris for a brief period (from 18th March to 28th May, 1871) after the evacuation of the German troops, and had to be suppressed by troops collected by the National Assembly of France.

Communism, the economic system or theory which upholds the absorption of all proprietary rights by the community, and the equal division of labour and income among its members. No communistic society has as yet been successful. Robert Owen and Étienne Cabet made several experiments in modified communism, but they failed. Communism must be distinguished from collectivism, which holds that the community should own all the means of production, and itself carry on production. Bolshevism (q.v.) is merely communism put into practice.

Comneni, an extinct family of sovereigns, statesmen, generals, and authors, said to be of Roman origin, to which belonged, from 1057 to 1185, six emperors of the East: Isaac I, Alexis I, John II, Manuel I, Alexis II, and Andronicus I.

Como, capital of the province of Como,

in the north of Italy, in a delightful valley at the south-west extremity of Lake Como. It has a school of sericulture, and manufactures silk, satin, gloves, and soap. Pop. 48,066.—The province of Como has an area of 1105 sq. miles, and a pop. of 630,393.

Como, Lake of, a lake in the north of Italy, at the foot of the Alps, fed and drained by the River Adda, which carries its surplus waters to the Po. It extends from south-west to north-east 30 miles, giving off towards the middle a branch running for about 13 miles south-east called the Lake of Lecco; greatest width, 2½ miles; greatest depth, 1929 feet. It is celebrated for the beautiful scenery of its shores, which are covered with handsome villas, gardens, and vineyards, mountains rising behind to the height of 7000 feet. Trout and other fish abound in the lake.

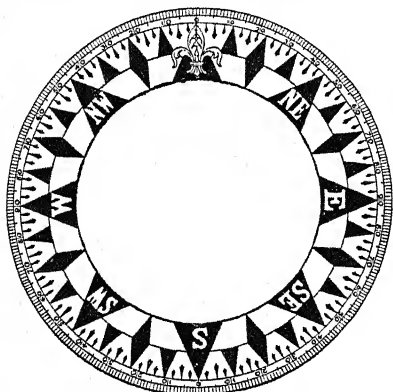
Comorin, a cape forming the south extremity of India, and consisting of a low sandy point.

Comoro Islands, a volcanic group in the Indian Ocean, west of the north of Madagascar. They are four in number: Great Comore, Moheli, Anjouan, and Mayotte; total area, 790 sq. miles; pop. 109,860. The people are nominally Mahomedans, and are akin to the mixed races of Zanzibar. They have large flocks and herds; and the coast lands are very fertile, abounding in tropical grains and fruits. The principal product is vanilla, but sugar, rum, and perfume plants are also exported. By a law of 1912 and a decree of 1914 the whole archipelago became a French colony, attached to Madagascar. See *Mayotte*.

Company, a sub-division of an infantry battalion. The double-company, introduced in 1914, consists of 220 men, and is commanded by a major or mounted captain. See *Army*.

Compass, an instrument used to indicate the magnetic meridian or the position of objects with respect to that meridian. In its simplest form it consists of a card marked N., S., E., W. (the cardinal points) with various sub-divisions, and a magnetized needle which swings freely, but which, when stationary, points to the magnetic north. In the *mariner's compass* several small magnets are attached to the card, which rotates and is mounted in a brass bowl. This is hung by two concentric

rings called gimbals, so that in all motions of the ship the card shall remain horizontal. On the inner surface of the bowl and on the fore and aft line is a mark (the lubber's line). Therefore since the north arrow on the card points approximately to the magnetic north, the reading indicated by the lubber's line gives the course of the ship. *Deviation* is the angle included between the compass north and the magnetic north, and is affected by iron-work on the ship and various influences in the ship. *Variation* is the angle between the true north and the magnetic north.



Compass Card

Leeway is the angle between the ship's compass course and her course as shown by the wake. The *true course* of a ship is the initial compass reading corrected for deviation, variation, and leeway. Many improvements have been made in recent years, and the gyro-compass (q.v.) is now frequently used. See *Deviation*.—BIBLIOGRAPHY: S. P. Thompson, *The Rose of the Winds: the Origin and Development of the Compass Card*; Admiralty Manual, *Deviations of the Compass*.

Compensation. This is a term applied in both English and Scottish law to money payments made in respect of the compulsory acquisition of lands by Government departments, public or local authorities, public undertakings and others, pursuant to Act of Parliament, e.g. for the construction of railways, harbours, docks, or waterworks, the making and widening of roads, and other purposes

of a public nature. Prior to 1845 it was the custom to incorporate compensation clauses in the special Act applying to each particular body or undertaking. But in 1845, for the purpose of establishing one general authority regulating the compulsory acquisition of lands for objects of a public or quasi-public nature, and the payment of compensation, the Lands Clauses Consolidation Act was passed. The purchasing undertaking serves upon the owner a 'notice to treat' stating the lands which it intends to take over. The parties may agree both as to extent of property to be surrendered and as to amount of compensation. The owner, however, may object that the portion required is only part of a whole, and so demand that the entire area be taken. Generally such a demand is met. Compensation is awarded not only in respect of the actual subjects transferred, but also in respect of the diminished value of the residue. If agreement is not reached arbitration is usually resorted to.

The Acquisition of Land (Assessment of Compensation) Act, 1919, establishes a panel of official arbitrators for assessing the compensation to be made for land compulsorily acquired by a public authority for public purposes, abolishes the practice of awarding an additional allowance on account of the compulsory acquisition, and takes the value to be the amount which the land would realize if sold in the open market by a willing seller. The term *compensation* is also applied to payments made by public authorities for damage done to property by riot or civil commotion; to payments to workmen for injuries sustained in the course of their employment (see *Employers' Liability*; *Workmen's Compensation*); to the damages paid in certain circumstances to owners of property on the non-renewal of their tenants' licences, equivalent to the difference between the value of the property as licensed and the value as unlicensed; and to the payments due to the tenant of a holding under the Agricultural Holdings Acts of the determination of his tenancy in respect of improvements, disturbance, unexhausted manure, &c. An important use of the term, and one peculiar to Scotland, remains to be noticed. There it is employed to denote the extinction, in whole or in part, of the mutual obligations in cases where two parties are each in the

position of creditor and debtor to one another. If the debts are of equal amounts, they are cancelled; if of unequal amounts, only the excess of the larger over the smaller remains exigible. The rules governing the operation of compensation in this sense of the term are briefly these: (1) Each party must be creditor and debtor to the other at one and the same time and each in his own right. (2) The debts must be of the same kind or quality. (3) The debts must have been ascertained and constituted either by a decree of the court or by the writ or oath of the debtors, or must be due in respect of the same contract. See *Set Off*.

Competition, in economics, means rivalry in supplying an economic demand. Economically competition has been considered as good and advantageous for the consumer, acting as an agent of natural selection for the benefit of the masses. The Manchester school of economists and the followers of the principle of *laissez faire* favour competition, finding in it the only inherent law of industry and commerce. They claim, too, for it that by creating rivalry between employers it compels them for their own sakes to increase the wages of the employed. Thus it is of advantage both to the consumer and the wage-earner. Socialists, on the other hand, assert that as free competition does not bring about a natural survival of the fittest, it is at the root of much industrial evil, and they claim that State interference and restriction are necessary to bring about an orderly distribution of the common wealth. They claim, too, that competition defeats its own end because, by the establishment of gigantic trusts and syndicates—the inevitable result of the system—the smaller concern is doomed to failure, and though at first the consumer is benefited, ultimately he is forced to buy at whatever price the producer may care to ask. This criticism, however, leaves out of consideration the individual initiative which alone, according to the individualists, is responsible for progress. Although in recent times Governments have introduced measures intended to put a stop to international competition, there is no doubt that free competition will be for some considerable time at the basis of economic activity both in Western Europe and in America.

Compiègne, a French town, department of Oise, on the left bank of the Oise. It has several magnificent buildings, including a château built by St. Louis. Pop. 16,660.

Compositæ, the largest known natural order of plants, containing over 12,000 described species of herbs or shrubs, about 10 per cent of all flowering plants, distributed all over the world. The flowers are numerous (with few exceptions) and sessile, forming a close head or *capitulum* on the dilated top of the receptacle, and surrounded by an *involucre* of whorled bracts. The flowers are gamopetalous, and the order is divided into two natural groups from the form of the corolla: (1) *Tubulifloræ*, in which the central or disc florets at least, are tubular, with five, rarely four, teeth; (2) *Ligulifloræ*, in which all the florets are slit or ligulate. The calyx is suppressed, its protective rôle being assumed by the involucre enclosing the whole inflorescence. The stamens are inserted on the corolla, and their anthers are united into a tube (*syngenesious*). The fruit, which arises from an inferior ovary, is dry and seed-like, and generally bears a parachute-like tuft of hairs (*pappus*) for wind-dispersal, well seen in the familiar dandelion 'clock'.

Compounding of Felony, the acceptance of a consideration for forbearing to prosecute; or the agreeing to receive one's goods again from a thief on condition of not prosecuting. This is an offence punishable by fine and imprisonment.

Compressed Air is used industrially for many purposes. The air may be used at a high pressure (100 to 5000 lb. per square inch, say) or at a low pressure (15 to 20 lb. per square inch, say). Pneumatic tools work with air at about 80 lb. per square inch.

Low-pressure air is used in the salving of ships, the construction of caissons (q.v.), tunnels, &c., and with furnaces. In ship salving, large pipes are fastened to openings fashioned in any suitable manner, and air is blown into the ship. The water in the ship is blown out through vents left for this purpose, with the result that the ship recovers buoyancy and rises.

In blast-furnaces the blast is usually supplied at about 10 to 15 lb. per square-inch pressure.

In all these instances the compressed air is supplied by large 'blowing engines',

which are simply bicycle pumps on a large scale. They are driven usually by steam-engines.

High-pressure air is used for working pneumatic tools, such as riveting hammers, caulking tools, &c.; small machines; rock drills, especially in the South African gold-mines; the propulsion of torpedoes and the control of submarines. Pressures range from about 80 lb. per square inch for tools to about 4000 lb. per square inch in torpedoes.

The tools are made with a small pneumatic engine in them, which is worked by the air much as a steam-engine is by steam.

In torpedoes a space in the middle of the torpedo is used as a reservoir, and is filled with highly compressed air (at about 4000 lb. per square inch). Aft of the reservoir is an air-engine, which works the tail propellers of the torpedo. When the torpedo is 'fired', it is blown out of the 'torpedo tube' by compressed air, and the supply of air to the torpedo engine is automatically started. After the torpedo 'takes the water', it is propelled by the energy of the air stored in it, which is sufficient to give it a range of about 7 miles at a speed of 35 to 40 knots.

A submarine is fitted with a series of tanks communicating with the sea through sea-cocks. When the submarine submerges, these are wholly or partially flooded. To rise, the water in these tanks is expelled by means of compressed air. The compressed air is stored in bottles at very high pressure, and part of the mechanical equipment of a submarine is an air compressor for charging the bottles. Air subjected to a high pressure gets very hot. To minimize this heating, the compression is carried out in several cylinders, i.e. in 'stages', the air being cooled by water in passing from one stage to the next. Compressed-air plants are subject to trouble in cold weather from the freezing of the water-vapour in the air.

Compton, Edward (1854-1918), British actor and author. In 1881 he organized the Compton Comedy Company. He wrote several plays, and a life of his father.

Compurgation, a mode of defence allowed by the Anglo-Saxon law in England. The accused was permitted to call a certain number of men (from one to thirty, but usually twelve), called compurgators, who joined their oaths to his

in testimony to his innocence. They acted rather in the character of jurymen than that of witnesses, for they swore to their belief, not to what they knew.

Comstock Lode, a lode exceptionally rich in gold and silver ores on the east slope of the Virginia Mountains, in Nevada, U.S.A., not far from the Californian border.

Comte, Isidore Auguste Marie François Xavier (1798-1857), founder of the 'positive' system of philosophy. He was educated at the École Polytechnique, and embraced enthusiastically the Socialist tenets of St. Simon. As one of his most distinguished pupils he was employed, in 1820, to draw up a formula of the doctrines professed by the St. Simonian school, which he accordingly accomplished in his *Système de Politique Positive*. In 1830 he commenced the publication of his *Cours de Philosophie Positive*, which was completed in six volumes in 1842. His other works include: *Positive Polity* (1851-1854), *The Positivist Catechism* (1852), and *Subjective Synthesis* (1855). His works have been made known to English readers mainly by G. H. Lewes's *Comte's Philosophy of the Sciences*, Miss Martineau's translation, and the writings of E. Caird, E. S. Beesley, and F. Harrison.—**BIBLIOGRAPHY:** J. S. Mill, *Auguste Comte and Positivism*; J. Fiske, *Outlines of Cosmic Philosophy*; E. Caird, *The Social Philosophy and Religion of Comte*.

Comus, in the later Greek mythology, the god of revelry, feasting, and nocturnal entertainments, generally represented as a drunken youth.

Comyn, John (d. c. 1300), Scottish baron. On the competition for the Scottish throne in 1291 Comyn put in a claim as a descendant of Donald Bane. His son, John Comyn, called the 'Red Comyn', was chosen one of the three guardians of Scotland, and defeated the English at Roslin in 1302. He submitted to Edward I in 1304, and was killed by Bruce in the Convent of the Minorites at Dumfries in 1306.

Conacre, a term applied to a system, common in Ireland, of underletting a portion of a farm for a single crop, the rent being paid to the farmer in money or in labour.

Concepcion, a seaport of Chile, capital of a province of the same name, on the right bank of the Biobio. Its port at Talca-

huano, on the Bay of Concepcion, about 8 miles distant, is one of the best in Chile. There is a university (opened 1920). Pop. 64,074. — The province of Concepcion is an important agricultural district, and has valuable coal-mines. Area, 3318 sq. miles; pop. 247,611.

Concepcion, a town in Paraguay, on the Paraguay River. Pop. 15,000.

Conception, Immaculate, in the Roman Catholic Church, the doctrine that the Virgin Mary was born without the stain of original sin. This doctrine came into favour in the twelfth century; it afterwards became a subject of vehement controversy between the Scotists, who supported, and the Thomists, who opposed it. In 1708 Clement XI appointed a festival to be celebrated throughout the Church in honour of the immaculate conception, but the doctrine was not an article of faith until the year 1854.

Concertina, a musical instrument invented in 1829 by Sir Charles Wheatstone. It is composed of a bellows, with two faces or ends, generally polygonal in shape, on which are placed the various stops or studs, by the action of which air is admitted to the free metallic reeds which produce the sounds. The accordion, a similar instrument, was invented by Damian of Vienna in 1829. It is in the form of a small box containing a number of metallic reeds fixed at one of their extremities, the sides of the box forming a folding apparatus which acts as a bellows to supply the wind, and thus set the reeds in vibration and produce the notes.

Conchology, the science of shells, that department of zoology which treats of

into three orders, Univalves, Bivalves, and Multivalves, according to the number of pieces of which they are composed.

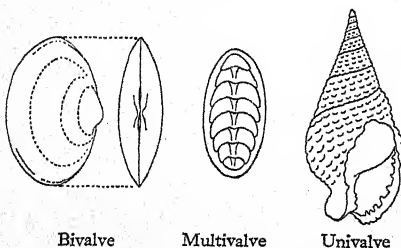
Conciliation Act, an Act passed in 1896 to take the place of earlier Acts of a similar kind and providing machinery for preventing and settling trade disputes. Boards or bodies formed for the purpose of settling disputes between employers and workmen by conciliation and arbitration may be registered by the Board of Trade as 'conciliation boards', and the Board provides regulations for conciliation proceedings, and may itself take important measures by inquiry and otherwise to bring about a settlement by conciliation or arbitration, if both parties agree to arbitration. Boards of conciliation have been established in almost all important industrial centres, and have been of marked advantage in helping to prevent strikes.

Conclave, the place where the cardinals assemble for the election of the Pope; also the electoral assembly of the cardinals themselves. Pope Gregory X established in the council at Lyons (1274) the regulations of the conclave. The cardinals are shut up together in a particular suite of apartments in the palace where the pontiff dies, and they are supposed to have no communication with the outside world during the period of election.

Concord, several places in the U.S.A., particularly the capital of New Hampshire, with manufactures of carriages, hardware, woollens, and paper. Pop. 22,167.

Concordat, a convention between the Pope, as head of the Roman Catholic Church, and any secular government for the settling of ecclesiastical relations. One of the most important of the earlier concordats, that of Worms, called also the *Calixtine Concordat*, made in 1122 between Pope Calixtus II and the Emperor Henry V, has been regarded as the fundamental law of the Church in Germany. Another celebrated concordat was that agreed upon between Cardinal Gonsalvi, in the name of Pius VII, and Napoleon in July, 1801. This concordat was practically abrogated by the law of 9th Dec., 1905.

Concrete, an intimate mixture of broken stone, or gravel, and sand, with lime or cement. It is universally used in the foundations of buildings of every kind, bridge-piers, in the formation of walls of buildings, both in blocks and monolithi-



the nature, formation, and classification of the shells with which the bodies of many mollusca are protected. In systems of conchology shells are usually divided

cally, in concrete sewer tubes (from 18-inch to 4-foot diameter), in roadways to carry the heaviest traffic, in reinforced-concrete construction of walls, floors, and stanchions, and, finally, as the latest development, in the building of concrete barges and sea-going ships up to 2000 tons. (1) *Lime concrete*.—This may be

normally composed of six parts of clean broken shingle or brick, two parts of washed sand, and one part of ground lias lime. The whole is thoroughly well mixed together in a dry state, and then sufficient water is added to bring the whole to a semi-plastic state on further mixing. No more water should be added than is necessary to bring it to this state. (2) *Cement concrete*.—During the past decade Portland cement has almost superseded lime in the making of concrete, the resulting mixture having a much greater ultimate strength, and being free from certain defects of lime concrete when used in large masses. The 'aggregate', or broken stone used, may vary in size from $\frac{1}{2}$ -inch chippings to 3-inch gauge, according to the purpose for which it is to be used. A proper proportioning of the sand to fill the voids in the 'aggregate', and of the cement to fill the voids in the mixture, is necessary for a sound and economical mixture, and cleanliness and clean water are essential.—BIBLIOGRAPHY: Kempe, *Engineer's Year Book*; C. F. Mitchell, *Building Construction*; C. F. Marsh and W. Dunn, *Reinforced Concrete*.

Concretion, in geology, a mass of a more or less nodular form, and sometimes nearly spherical, resulting from the coming together of mineral matter in a rock in which it has been at one time diffused. Concretions often occur along certain horizons, following the stratification. While some concretions may arise from a local concentration of cementing material in a rock, usually an exchange of substance has taken place, as when clayey matter has been removed to make way for a deposition of iron carbonate or iron sulphide. Flints, which replace in every detail the calcareous structures of a limestone, are examples of concretions formed by complete substitution. A quarry may be worked for the sake of its concretions of ironstone, calcium phosphate, or other substances.

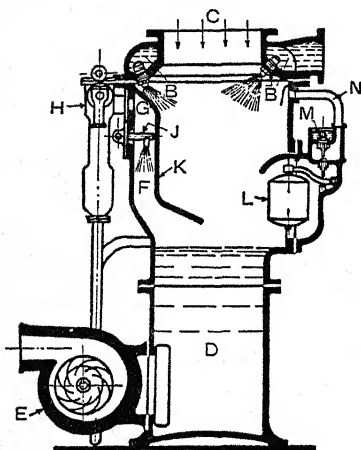
Concussion of the Brain, a term applied to certain injuries of the brain

resulting from blows and falls, though they may be unattended with fracture of the skull. Stupor or insensibility, sickness, impeded respiration, and irregular pulse are the first symptoms, and though these may subside there is always for a time more or less risk of serious inflammation of the brain setting in.

Condé, Louis de Bourbon, Prince of (the *Great Condé*) (1621–1686), French general. During the troubles of the Fronde he at first took the side of the Court, but eventually put himself at the head of the faction of the *Petits Maitres*, and was imprisoned for a year by Mazarin (1650). On his release he retired to the Netherlands, where he was appointed generalissimo of the Spanish armies. In this capacity he unsuccessfully besieged Arras in 1654; but he was more fortunate at Valenciennes in 1656, and at Cambrai in 1657. In 1658 he was defeated before Dunkirk by Turenne, but was restored to his rank in France after the peace of 1659. In 1668 he accomplished the reduction of Franche-Comté in three weeks; and in 1674 he defeated the Prince of Orange at Seneff. His successes over Montecuculi in Alsace in 1675 closed his military career.—Cf. Fitzpatrick, *The Great Condé and the Period of the Fronde*.

Condenser. Electrical.—An apparatus for storing electrical charges. It consists of two sets of metal plates separated from each other by an insulating medium called the dielectric. One set of plates is connected to the source of positive electricity, and the other to the negative pole or to earth. Condensers of variable capacity, in which air is the dielectric, are much used in wireless telegraphy. *Optical*.—The system of lenses in a magic lantern nearest the source of light. The rays of light are caused by it to converge on the picture. *Engineering*.—There are five types of steam condenser in common use: a *surface condenser* consists of a closed vessel containing tubes, on which the steam condenses. The cooling water is circulated through the tubes and absorbs the heat from the steam. The *jet condenser* (low- and high-level) is a cast-iron chamber into which the steam exhausts, meeting the injection water sprayed into the condenser through a perforated pipe or rose. The water falls to the bottom and is extracted, along with the air, by the wet air-pump. In the *low-level* type the injec-

tion water is caused to flow into the condenser by the vacuum; with the *high-level* or *barometric* type it is necessary to pump the injection water into the condenser. In the *ejector condenser* the injection water is supplied at the top with a head of about 15 feet, and acquires a high velocity in passing through a cone. The exhaust steam passes through a large



Low-level Jet Condenser

A, Cooling water inlet. B, Spray nozzles. C, Steam inlet. D, Sump. E, Water extraction pump. F, Air cooler. G, Air outlet. H, Ejector. J, Water spray. K, Cooler partition. L, Hollow float. M, Vacuum breaker valve. N, Air inlet.

number of inclined nozzles at a high velocity and meets the injection water flowing through the cone. The momentum acquired by the mixture is sufficient to discharge the water against atmospheric pressure. An *evaporative condenser* is usually arranged as a series of corrugated cast-iron pipes exposed to the atmosphere, the steam condensing inside the pipes. Water is allowed to trickle over the outside of the pipes, and some of this water is evaporated by the atmosphere.

Condillac, Étienne Bonnot de (1715–1780), French philosopher. His *Essai sur l'Origine des Connaissances Humaines* (1746), a summary of Locke's *Essay concerning Human Understanding*, struck the key-note of his system. In his *Traité des Systèmes* (1749) he continued the con-

demnation of all systems not evolved from experience or from sensation, such as the abstract systems of Descartes, Malebranche, Leibnitz, and Spinoza. In 1754 appeared his *Traité des Sensations*, and in 1755 his *Traité des Animaux*, a criticism of Buffon. His work *Le Commerce et le Gouvernement* appeared in 1776. He died shortly after the publication of his *Logic* in 1780, his *Langue des Calculs* being published posthumously in 1798. Condillac may be considered the forerunner in psychology, ethics, and sociology of the English school represented by Mill, Bain, and Spencer.—Cf. G. H. Lewes, *History of Philosophy*.

Condonation, in law, forgiveness of injury. In a petition for divorce on the grounds of adultery condonation or complete forgiveness so as to restore between the spouses the *status quo ante* is a complete defence. An act once condoned is in the eyes of the law as if it had never been committed unless the guilty party repeats the offence, or revives it by a subsequent though lesser offence.

Condor, a bird found in the Andes, and one of the largest of the Vulturidæ.



Condor (*Sarcorhamphus gryphus*)

It is a big bird with a huge expanse of wing—sometimes measuring 10 feet from tip to tip—and nests at very high altitudes. The condor lives in groups of three or four, and descends to the plain to kill and

eat. They prefer carrion, and are so greedy that they will gorge themselves till movement is impossible; thus they are caught by man.

Condorcet, Marie Jean Antoine Nicolas de Caritat, Marquis de (1743-1794), French writer. At the age of twenty-one he presented to the Academy of Sciences an *Essai sur le Calcul Intégral*, and in 1767 his *Mémoire sur le Problème des Trois Points* appeared. During the first French Revolution he was elected deputy to the Legislative Assembly, of which he was soon appointed secretary, and in Feb., 1792, president. The fall of the Girondist party, 31st May, 1793, prevented the Constitution which Condorcet had drawn up from being accepted, and he was denounced as being an accomplice of Brissot. He lay in concealment for eight months, during which he wrote his *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain*. At last, however, he fled from Paris, and wandered about till arrested and thrown into prison, where he was found dead on the floor.—Cf. Lord Morley of Blackburn, *Critical Miscellanies*.

Condottieri, the captains of those bands of mercenary soldiers who, in the fourteenth and fifteenth centuries, hired themselves out to carry on the petty wars of the Italian states. Among the most noted leaders of the condottieri were Sir John Hawkwood, commander of the famous White Company, Carmagnola, and Sforza Attendolo, whose son made himself Duke of Milan.

Condy's Fluid, a sanitary and antiseptic preparation of permanganate of potash which is now largely used as a deodorizer and disinfectant in fevers, &c. It is also employed as a gargle in diphtheria and other throat affections, and is especially valuable for cleansing ulcers and sores.

Conegliano, a town, Italy, 35 miles north of Venice. The place is noted for its sweet champagne. Pop. (commune), 10,350.

Coney Island, a small island of New York, at the west end of Long Island, south of Brooklyn, a favourite summer bathing-resort, having a fine beach, splendid hotels, and a great pleasure-ground.

Confederation of the Rhine, the league of Germanic states formed by Napoleon I in 1806, and including Bavaria, Württem-

berg, Baden, Hesse-Darmstadt, Westphalia, &c.

Confession, in relation to sin, is of two kinds: (a) Public confession, or confession before the whole congregation or meeting. (b) Private, or auricular, the disclosure of sins to the priest at the confessional, with a view to obtaining absolution for them. The practice of a public acknowledgment of great sins was altered by Pope Leo the Great, in 450, into a secret one before the priest, and the fourth general Lateran council (1215) ordained that every one of the faithful, of both sexes, come to years of discretion, should privately confess all their sins at least once a year to their own pastor.—Cf. H. C. Lea, *A History of Auricular Confession and Indulgences in the Latin Church*.

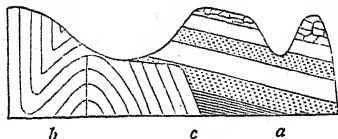
Confessional, in Roman Catholic churches and chapels, a kind of enclosed seat in which the priest sits to hear persons confess their sins. The confessional is often not unlike a sentry-box, the priest sitting within and the penitent kneeling without and speaking through an aperture.

Confession of Faith, a formal statement of religious beliefs, a kind of elaborate creed. What is most distinctively known by this name is the document prepared by the Assembly of Divines which met at Westminster in 1643. The Westminster Confession of Faith was adopted by the Assembly of the Church of Scotland, 27th Aug., 1647.

Confidential Communication, in law, a communication made by one person to another which the latter cannot be compelled to give in evidence as a witness, e.g. all communications between client and agent and between agent and counsel. The privilege does not extend to disclosures made to a doctor or to a priest.

Confirmation, the ceremony of laying on of hands by a bishop in the admission of baptized persons to the enjoyment of Christian privileges, the person confirmed then taking upon himself the baptismal vows made in his name. It is practised in the Greek, Roman Catholic, Lutheran, and English Churches. In the Roman Catholic Churches children are confirmed at the age of seven. In the Lutheran Church boys and girls are usually confirmed between the ages of thirteen and sixteen; while in the Church of England candidates for confirmation are generally between fourteen and eighteen years of age.

Conformable, in geology, a term applied to strata lying in parallel or nearly parallel planes, and having the same dip



The strata *a* are conformable (i.e. with each other). The strata *b* are also conformable with each other; but there is an unconformity at *c* between strata *a* and strata *b*.

and changes of dip; the opposite term being *unconformable*.

Confucius, or **Kong-fu-tse**, that is, 'the teacher, Kong' (551-478 B.C.), Chinese sage. He commenced his career as a teacher at the age of twenty-three. At the age of fifty-two he was made chief magistrate of the city of Chung-too. So striking a reformation was effected by him that he was chosen for higher posts, became Minister of Crime, and with the aid of two powerful disciples elevated the state of Lu to the foremost position in the kingdom. The name of Confucius is inseparably associated with the classical books of China which contain the foundations of their religious and political beliefs. Five of these books are called *King*; the others are called *Shu*. Confucius is said to have written only one *King*, the *Chumtsin*. Three other *Kings*, the *Shi* or Songs, the *Yih* or Natural Mutations, and the *Shu* or Book of History, he is said merely to have compiled or edited. The fifth *King*, the *Li-ki* or Memorials on Social Laws and Rites, appears to have been composed from information about Confucius. The four *Shu* are entirely by disciples of the sage. The teaching of Confucius has had, and still has, an immense influence in China, though he can hardly be said to have founded either a religion or a philosophy. Confucius was the type of the virtuous man without religion, although he was religious after the manner of religious men of his age and land. He was, above all, a political reformer, founding his political principles upon moral bases. All his teaching was devoted to practical morality and to the duties of man in this world in relation to his fellow-men; in it was summed up the

wisdom acquired by his own insight and experience, and that derived from the teaching of the sages of antiquity. To make oneself as good as possible was, according to Confucius, the main business of life. Like Socrates, he believed that vice was the result of ignorance, and that knowledge led to virtue and moral perfection. And the love of virtue that he felt himself he sought to develop in others by his teaching. Man's nature, according to Confucius, is originally good, and merely requires cultivation on right lines to bring it to its highest perfection. — BIBLIOGRAPHY: R. K. Douglas, *Confucianism and Taoism*; J. Legge, *The Religions of China*; G. G. Alexander, *Confucius*; W. E. Soothill, *The Analects of Confucius*.

Conger-eel, a genus of marine eels characterized by a long dorsal fin beginning near the nape of the neck, immediately above the origin of the pectoral fins, and by having the upper jaw longer than the lower. The best-known member of this genus is the *Conger vulgaris*, abundant in European waters.

Congestion, in medicine, is a hyperæmia in some part or organ of the body. Two forms are recognized, *active* and *passive*. The first is due to an increased amount of blood being brought to the part by the arteries, and the second occurs where there is delay in the return of the blood from a part due to obstruction of the veins. *Active* congestion may be caused by inflammation, by the action of certain drugs, or tight pressure. *Passive* congestion is shown by the affected part becoming dark-purple in colour (cyanosis). When the congestion is long-standing, œdema (dropsy) appears in the dependent parts of the body and fluid in cavities, e.g. in the chest or abdomen.

Congleton, a municipal borough of England, Cheshire, in a deep valley on the Dane. It has cotton and silk manufactures. Pop. (1931), 12,885.

Conglomerate, a term applied by geologists to rocks consisting mostly of water-worn pebbles cemented together by a matrix of siliceous, calcareous, or other cement, often called also *pudding stone*. When their cement decays, they yield, as a rule, very unpromising and gravelly soils.

Congo, one of the great rivers of the world, in Southern Africa, having its embouchure in the South Atlantic. The

mouth of the river was known to the Portuguese in 1485, but the lower part of its course was first explored by an English expedition under Captain Tuckey in 1816. In 1867 it was explored by Livingstone, and in 1876-1877 by Stanley. Its total length is about 3000 miles, and it drains an area of 1,400,000 sq. miles. Its chief tributaries are the Aruwimi and the Mobangi from the right, and the Ikelemba and Kwa from the left. It is navigable for about 100 miles from its mouth to Matadi. Above this are 249 miles of rapids. At Stanley Pool (Leopoldville) navigation again is possible for 1068 miles to Stanley Falls. Above this it is called the Lualaba, and is navigable for 585 miles.

Congo, Belgian, formerly **Congo Free State**, a Belgian territory on the River Congo, in Central South Africa, stretching by a kind of narrow neck of territory to the river's mouth, but expanding inland so as to cover an immense area, mainly lying south of the river. The obvious advantages of the Congo as a water-way in opening up the continent led to the formation at Brussels in 1878 of a Comité d'Études du Haut Congo, under the patronage of Leopold II. As agent of this association Stanley returned in 1879 to open up the river and form a free state under European protection. The work having been initiated by Stanley, King Leopold's association in 1884-1885 entered into treaties with all the European Powers, with the United States, and ultimately with Japan for the recognition of its sovereign power. The boundaries of the new *Congo Free State* were practically settled at the same time, and it was agreed that the basin of the Congo and its tributaries should be free to all nations, that no duties should be levied on imports (this was not adhered to), and that the slave trade should be suppressed. The state became formally a Belgian colony on 18th Oct., 1908. The Central Government is at Brussels, under the Colonial Minister. In Africa there is a Governor-General with many officials, and an armed force. A number of stations have been formed on the river, the chief being Boma, the capital, 70 miles from the mouth. Others are Banana, Matadi, Leopoldville, and Stanleyville. The exports are rubber, palm-oil and kernels, ivory, copal, copper, ground-nuts, &c. Copper-mining is im-

portant on the south-east (see *Copper*). There are 1663 miles of railways (including two sections on the Cape-to-Cairo route) and 5609 miles of road. Area estimated at 909,654 sq. miles; pop. at 9,000,000 (7000 Europeans). It is important to see also *Urundi and Ruanda*. Cf. Naval Intelligence Division, *A Manual of the Belgian Congo*.

Congregationalists, formerly called **Independents**, a Christian sect claiming to continue the primitive form of Church government; founded by the moderate party among the Brownists and Barrowists early in the seventeenth century. Congregationalism was associated in its origin with Puritanism, of which it was the most radical expression. Each congregation is governed by all the members of that congregation, and not, as in the Presbyterian Church, by a session of the pastor and ruling elders only. In doctrine the majority are evangelical, though in individual churches considerable latitude is shown. The number of Congregational churches and mission-stations in the British Islands is about 5000, of which more than 4500 are in England and Wales. The body has about 500,000 members and over 3000 accredited ministers.—Cf. R. W. Dale, *History of English Congregationalism*.

Congress. See *United States*.

Congreve, William (1670-1729), English dramatist. A novel entitled *Incognita*, under the pseudonym of Cleophil, was followed, at the age of twenty-one, by his comedy of *The Old Bachelor*. His next play, *The Double Dealer*, was less successful; his third comedy, *Love for Love*, and his tragedy, *The Mourning Bride* (1697), were both popular; but after the cold reception of his *Way of the World*, in 1700, he ceased altogether to write for the stage, though he still wrote occasional verses on public subjects. Congreve is thought by many competent critics to be the greatest English master of pure comedy. Unfortunately for him, his work has often been associated with the coarse and brutal work of Wycherley, with whom he has really little in common. His plays, especially *The Way of the World*, are masterpieces, and rank with all Molière's plays, except his very greatest.—Cf. Sir Edmund Gosse, *The Life of William Congreve*.

Conic Sections, three curves, the *hyperbola*, the *parabola*, and the *ellipse*, formed by the intersection of a right

circular cone with planes that cut the cone in various directions. The curves may also be obtained as plane sections of an oblique circular cone. The definition of the curves as sections of a cone is the one which was used by ancient geometers; later they were defined as the loci of points which move so that their distance from a fixed point (focus) is in a constant ratio to their distance from a fixed straight line (directrix). If this ratio (e) is greater

is exceedingly poisonous, appearing to cause death by inducing paralysis of the muscles used in respiration.

Conington, John (1825-1869), English classical scholar. He studied at Rugby and Oxford, where he held the Latin chair from 1854 till his death. His chief work was an edition of Virgil; he also translated Virgil's *Æneid*, part of Homer's *Iliad*, and the *Odes*, *Satires*, and *Epistles* of Horace. His translation of Horace is admirable in every respect, and is easily the best complete version in English.

Coniostres, in ornithology, a sub-division of the order Insesores or Passeres, consisting of genera to which belong the larks, tits, finches, sparrows, goldfinches, linnets, bullfinches, starlings, and crows.

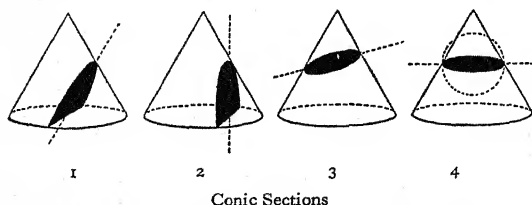
Coniston, a name of several applications in North Lancashire, in the English Lake District. Coniston Water is a lake about 6 miles long and half a mile broad. It is overlooked by the fine group of mountains called Coniston Fells, rising in the Old Man to the height of 2633 feet. Coniston village is near the head of the lake.

Conjeeveram, a town of India, Presidency of Madras, district of Chingleput. It possesses two famous pagodas dedicated to Vishnu and Siva, and is one of the seven sacred cities of India. The inhabitants are mostly Brahmans. Cottons are manufactured in the town. Pop. 61,376.

Conjugal Rights, in law, the right which husband and wife have to each other's society, comfort, and affection. A suit for restitution of conjugal rights is competent by either party in the English Divorce Court.

Conjunction, in astronomy, the position of two of the heavenly bodies, as two planets, or the sun and a planet, when they have the same longitude, that is, when their directions projected on the ecliptic or earth's orbital plane coincide. When it is simply said that a planet is *in conjunction*, conjunction with the sun is to be understood.

Conn, Lough, a lake in the north of County Mayo, Irish Free State, separated from Lough Cullin by a narrow channel. The two extend for about 13 miles and are studded with islands.



Conic Sections

1, Parabola. 2, Hyperbola. 3, Ellipse. 4, Circle.

than 1, the curve is a hyperbola; if less than 1, the curve is an ellipse; if e is equal to 1, the curve is a parabola.

Coniferales, **Coniferæ**, or **Conifers**, the largest and most important group of living gymnosperms, so-called from their cones, which are commonly of the type seen in the Scotch pine. They are all woody plants, and mostly tall evergreen trees (the larch is a deciduous conifer) of temperate and arctic zones and of high tropical mountains. Immense forests of conifers exist in the north temperate zone, on the Pacific slope of North America, and in the Himalayas. The anatomy resembles that of woody dicotyledons, but the wood is generally simpler and more uniform in composition. The leaves are always more or less xerophytic, the pine-needle being an extreme case. **Coniferales** are wind-pollinated; the pollen is produced in incredible quantities, and the wastage is enormous. The seeds are also often wind-borne, but sometimes adapted for bird-dispersal. **Coniferales** take the first place among timber trees.

Conine, **Coniine**, or **Cicutine** ($C_8H_{17}N$), a volatile alkaloid, the active poisonous principle of hemlock. It exists in all parts of the plant, but especially in the not quite ripe seed. It is one of the few alkaloids which have been prepared synthetically, and is a derivative of pyridine. It

Connaught, Arthur William Patrick Albert, Duke of (1850—), third son of Queen Victoria. In 1879 he married Princess Louise, daughter of Prince Frederick Charles of Prussia. He saw service in Canada, Egypt (at the battle of Tel-el-Kebir in 1882), and in India (1886–1890). He was Governor-General of Canada from 1911 to 1916. In 1920 he visited India, and opened the new Legislative Assembly there in 1921.

Connaught, Prince Arthur of (1883—), son of the preceding. In 1913 he married Alexandra, Duchess of Fife, daughter of the Princess Royal. He was Governor-General and Commander-in-Chief of South Africa from 1920 to 1923.

Connaught, the smallest of the four provinces of Ireland, situated between Leinster and the Atlantic; area, 4,228,211 acres. Its west coast is much broken up by numerous bays and inlets, and is thickly studded with islands. The central parts are comparatively level and of limestone formation, while the surrounding mountains are formed of sandstone, clay-slate, granite, and quartz. A large proportion of the province is bog, and, generally, it is the least fertile of all the provinces. It is divided into five counties—Galway, Mayo, Roscommon, Leitrim, and Sligo. Pop. (1926) 552,757.

Connecticut, a river, U.S.A., the west branch of which forms by treaty the boundary between the United States and Canada to lat. 45° N. It rises on the north border of New Hampshire, and falls into Long Island Sound. Its length is 450 miles, and it is famed for its shad fisheries.

Connecticut, one of the original thirteen states of the American Union; bounded by New York, Massachusetts, Rhode Island, and Long Island Sound; area, 5004 sq. miles, of which 145 sq. miles are water area. Its principal river is the Connecticut, which divides it into two nearly equal parts. The coast is indented with numerous bays and creeks, which furnish many harbours. Its minerals comprise iron, copper, lead, cobalt, plumbago, marble, freestone, porcelain-clay, and coal. The soil is in general better suited for grazing than tillage, and there are everywhere fine meadows. But there are ample crops of Indian corn, rye, wheat, oats, barley, buckwheat, and potatoes; and fruits, particularly apples, flourish.

The manufactures consist chiefly of woollen, cotton, and silk goods, metal goods, paper, clocks, &c. The principal exports consist of agricultural produce and manufactures. There is a large coasting trade, and cod fishing is extensively carried on. The chief educational institution is Yale University, New Haven, founded in 1701, one of the most celebrated in the United States. The seat of government is Hartford, but the largest town is New Haven. Other populous places are Bridgeport, Waterbury, and Meriden. The state at one time consisted of two colonies—Connecticut, settled from Massachusetts in 1633, and New Haven, settled by English in 1638. The two colonies were united in 1665. Pop. 1,380,631.

Connective Tissue. See *Tissues*.

Connemara, a boggy and mountainous district occupying the west portion of County Galway, Irish Free State; about 30 miles long and 15 to 20 miles broad. There is much wild and picturesque scenery. Many of the people support themselves by fishing. Connemara ponies are famous.

Conolly, John (1794–1866), English physician. He introduced the rational and humane treatment of the insane, discarding all forms of mechanical restraint, and helping largely to bring about the revolution in lunatic asylum management that took place. He was the author of *Construction and Government of Lunatic Asylums* and of several other works.

Conrad, Joseph (1856–1924), British novelist. The son of a Polish revolutionary, his real name being Konrad Korzeniowski, he passed his youth in Poland and the Ukraine. In 1878 he landed at Lowestoft, subsequently became a mate on an English ship, and a master in 1884. Although he was nearly twenty before he learned English, he nevertheless acquired a wonderful style, strong and idiomatic. His works, remarkable for their vivid description of seafaring life and of the Far East, include: *Almayer's Folly*; *An Outcast of the Islands*; *The Nigger of the Narcissus*; *Tales of Unrest*; *Lord Jim*; *The Inheritors* and *Romance*, both with F. M. Hueffer; *Typhoon*; *The Shadow Line*; *Youth*; *The Mirror of the Sea*; *'Twixt Land and Sea*; *Chance*; *Nostromo*; *The Arrow of Gold*; *A Personal Record*; *The Rescue*; *The Rover*; and *Tales of*

Hearsay.—Cf. R. Curle, *Joseph Conrad*.

Consalvi, Ercole (1757–1824), cardinal and Prime Minister of Pope Pius VII. He concluded the famous concordat with Napoleon in 1801, and was Papal minister at the Congress of Vienna.

Conscience, Hendrik (1812 – 1883), Flemish novelist. Some of his novels are based on the history of his country, others are pictures of everyday Flemish life. They include: *The Lion of Flanders*, *Jakob van Artevelde*, *The Poor Nobleman*, *The Young Doctor*, and *Maternal Love*.

Conscientious Objectors, a term applied in Great Britain during the European War to all those who, after the passing of the Military Service Act in 1916, refused military service on religious or conscientious grounds. The local tribunals set up for the purpose granted exemption to some objectors, whilst others were required to do work of national importance. Many of them were imprisoned. Those of the conscientious objectors who had not done any work of national importance were disfranchised for five years in 1918, under the Representation of the People Act.

Conscription, the enlisting of the inhabitants of a country capable of bearing arms, by a compulsory levy, at the pleasure of the Government, being thus distinguished from *recruiting*. A French Act, passed in 1872, and other subsequent enactments, affirm the universal liability to conscription upon all males not physically incapacitated who have completed their twentieth year. The term of service was reduced to two years in 1905, but increased to three in 1913. Universal liability to military service is also the law in Italy, Denmark, Norway, Greece, Japan, and other countries, the period at which liability begins being usually on the completion of the twentieth or the twenty-first year, while the total length of service varies, as does also the period of service in the active army, and the various reserves or other bodies. In the Netherlands service is partly voluntary and partly compulsory. Before the Revolution (1918) in Germany and Austria, military service was universal and compulsory in these countries. Conscription was introduced into Great Britain by the Military Service Act, 1916; it applied to men from eighteen to forty years of age. Under the Military Service Act, 1918, the age for

compulsory service was raised to fifty years for men in general. This Act ceased to be valid in 1920.

Consent, in law, is understood to be a free and deliberate act of a rational being. It is invalidated by any undue means used to obtain it. Idiots, pupils, &c., cannot give legal consent, but their consent may be implied by law in contracts made by them for necessities. Persons in a state of *absolute* intoxication cannot give legal consent.

Conservative Party, in British politics, the party that substantially corresponds to what used to be the Tory party, taking the opposite side to the *Liberals*. The name came into use about the time of the passing of the Reform Act of 1832.

Conssett, a town (urban district) of England, county Durham, with ironworks and coal-mines. Pop. (1931), 12,251.

Consignment, a mercantile term which means either the sending of goods to a factor or agent for sale, or the goods so sent. In most countries a consigner can claim his goods and collect all outstanding debts for goods sold on his account by a consignee who has suspended payment. See *Freightment*.

Consolato del Mare, a celebrated collection of maritime customs and ordinances of various Italian cities, as Venice, Genoa, Pisa, and Amalfi, together with those of the cities with which they traded, as Barcelona, Marseille, &c. It has formed the basis of most of the subsequent compilations of maritime laws. The name is derived from the fact that it embodied the rules followed by the commercial judges, known generally as Consuls. The book was first published at Barcelona in 1494.

Consolidated Fund, the fund which receives the produce of the permanent taxes and other sources of revenue of Great Britain and Ireland, originally formed in 1787 by the union of certain separate funds. 'Consolidated Fund Services' are those payable out of their permanent fund and not subject to annual grant by Parliament. Their security is therefore guaranteed, and the officials so paid are above ordinary parliamentary control. The stated charges upon the consolidated fund, besides the national debt, are the Civil List, pensions, annuities, salaries of the judges and of certain officials, the expenses of the courts of

justice, and miscellaneous charges. See *National Debt*.

Consols, or Consolidated Annuities, a public stock forming the greater portion of the national debt of Great Britain. It was formed in 1751 by an Act consolidating several separate stocks bearing interest at 3 per cent into one general stock. The average price of £100 consols was £74, 16s. 10½d. in 1914; £59, 10s. in 1918; £51, 13s. 6d. in 1919 (August); £47, 10s. in 1920; and in 1930 (Nov.), £58, 15s. See *National Debt*.

Conspiracy, in law, an offence ranked as a misdemeanour, and punishable by imprisonment and hard labour. It is constituted by an agreement between two or more persons to do an unlawful act or to do a lawful act by unlawful means.—

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Constable, Archibald (1774 – 1827), Scottish bookseller and publisher. He was the original publisher of *The Edinburgh Review*, the poems of Sir Walter Scott, the *Waverley Novels*, the *Supplement to the Encyclopædia Britannica*, and other works. In 1826, however, the firm was compelled to stop payment with liabilities exceeding £250,000.

Constable, Henry (1562–1613), Elizabethan poet. He early became a Roman Catholic, and endeavoured to secure the removal of the disabilities of English Catholics. His chief work was his book of sonnets, *Diana*, published in 1592.

Constable, John (1776–1837), English landscape painter. Among his principal pictures are: *The Valley Farm*, *The Hay Wain*, and *The Cornfield*, all in the National Gallery; and *Salisbury Cathedral*, in the Victoria and Albert Museum. Many of his works have been finely engraved by David Lucas.—Cf. C. R. Leslie, *Memoirs of the Life of John Constable, R.A.*

Constable, an officer of high rank in several of the mediæval monarchies. Among the Franks, the *comes stabuli* became the first dignity of the Crown, commander-in-chief of the armies, and highest judge in military affairs. Louis XIII in 1627 abolished the office entirely. Napoleon re-established it, but it vanished with his downfall. In England the office of *Lord High Constable* was created by William the Conqueror. Since the attainder of Stafford, however, in 1521, Lord High

Constables have been appointed only to officiate on special occasions. The office of Lord High Constable of Scotland is hereditary in the noble family of Hay (Earls of Erroll).

In the common modern acceptance of the term constables are police officers. In case of special disturbance a certain number of private citizens may be sworn in as *special constables* (q.v.).

Constance. See *Konstanz*.

Constance, Council of, a general council of the Church of Rome, held between 1414 and 1418. It condemned to death Huss and Jerome of Prague, expelled the rival Popes John XXIII, Gregory XII, and Benedict XIII, and elected Martin V (Otto Colonna) to the Papal chair.

Constance, Lake of, a lake, Central Europe, in which Switzerland, Baden, Württemberg, Bavaria, and Austria (Vorarlberg) meet, forming a reservoir in the course of the Rhine; length, 42 miles; greatest breadth, about 8 miles; area, 208 sq. miles. At its north-west extremity the lake divides into two branches, each about 14 miles in length; the north called the Überlingersee, the south the Zellersee, in which is the fertile island of Reichenau, belonging to Baden. The lake, which is of a dark-green hue, is subject to sudden risings, the causes of which are unknown. The traffic on it is considerable.

Constant de Rebecque, Henri Benjamin (1767–1830), French politician. During the Revolution he distinguished himself by his works upon politics and on revolutionary subjects, and was elected to the office of tribune, but was dismissed in 1802. He again appeared at Paris in 1814, showing himself zealous in the cause of the Bourbons. His numerous writings include: *Cours de politique constitutionnelle* (1817) and *Adolphe* (1816), besides his more elaborate philosophical work, *De la Religion considérée dans sa Source, ses Formes, et ses Développements* (1824).

Constantia, a small district in Cape Province, a few miles from Cape Town, celebrated for its wine, which is esteemed the best liqueur wine after Tokay. There is a large Government vineyard.

Constantine, Gaius Flavius Valerius Aurelius Claudius (288–337), Roman emperor, surnamed the *Great*. After the death of his father, Constantius Chlorus, he was chosen emperor by the soldiery, in the

year 306. When fighting against Maxentius in Italy he saw, it is said, the vision of a flaming cross in the heavens, bearing the inscription 'Εν τούτῳ νικᾷ' or '*In hoc signo vinces*' ('by this conquer'). He vanquished his enemy and entered the city in triumph. In 313, together with his son-in-law, the eastern emperor, Licinius, he published the Edict of Toleration in favour of the Christians, and subsequently declared Christianity the religion of the State. Licinius, becoming jealous of his fame, twice took up arms against him, but was on each occasion defeated, and finally put to death. Thus in 325 Constantine became the sole head of the Roman Empire. In 329 he laid the foundation of a new capital of the empire, at Byzantium, which was called after him Constantinople, and soon rivalled Rome herself. He summoned the celebrated Council of Nicæa in 325 to settle the Arian controversy.—BIBLIOGRAPHY: J. B. Firth, *Constantine the Great*; C. B. Coleman, *Constantine the Great and Christianity*.

Constantine I (1868–1923), King of Greece. In 1889 he married Princess Sophia, sister of the ex-Kaiser Wilhelm II of Germany. On the assassination of his father on 18th March, 1913, he ascended the throne. He declared Greece neutral on the outbreak of the European War. His pro-German policy resulted in his deposition on 11th June, 1917. Constantine retired to Switzerland, and was succeeded by his second son, Alexander, who died on 25th Oct., 1920. Constantine was recalled in 1920; but owing to the utter defeat of the Greeks in Anatolia by the Turks, he was obliged to abdicate a second time on 27th Sept., 1922. He was succeeded by his son George II (b. 1890).

Constantine, a walled town in Algeria, capital of a department of same name. Roman remains abound. The manufactures consist chiefly of woollens, leather goods, and carpets. Its port is Philippeville, connected with it by rail. Pop. 78,220.—The department is the most fertile division of Northern Algeria, and has a pop. of 2,162,512.

Constantinople, called by the Turks *Stamboul*, a celebrated city of Turkey in Europe, situated on a promontory jutting into the Sea of Marmara, having the Golden Horn, an inlet of the latter, on the north and the Bosphorus on the east. The city proper is thus surrounded by

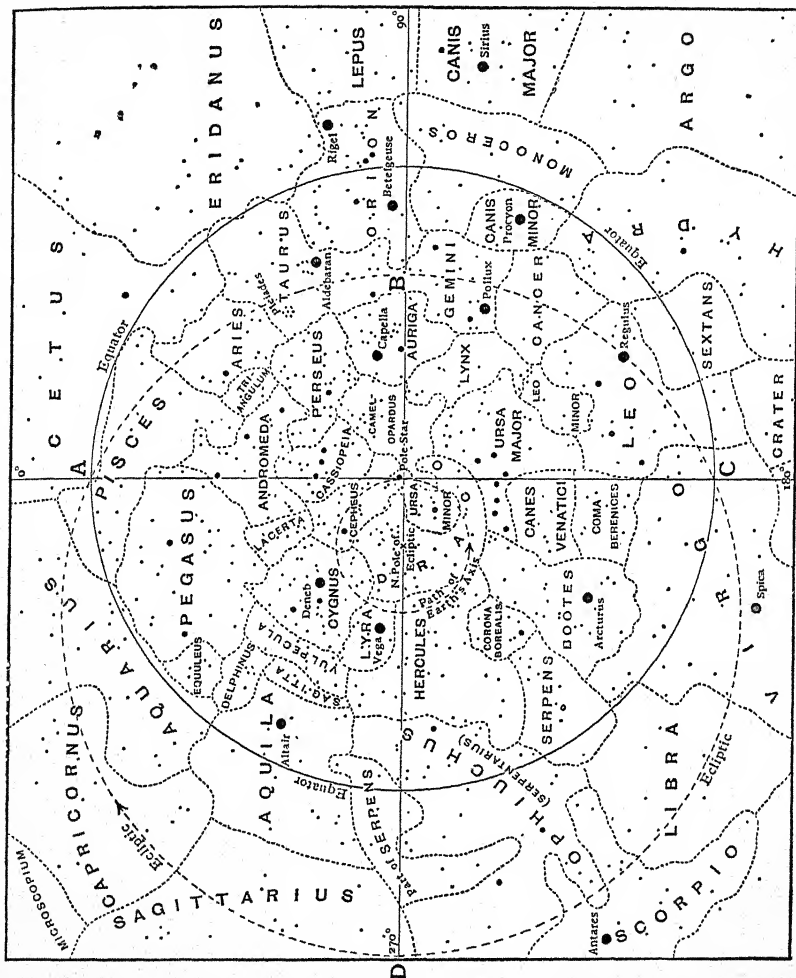
water on all sides excepting the west, where is an ancient and lofty double wall of 4 miles in length stretching across the promontory. On the opposite side of the Golden Horn are Galata, Pera, and other suburbs, while on the Asiatic side of the Bosphorus entrance is Scutari. At the principal entrance to the Seraglio or palace of the sultan is a large and lofty gate, called Bab Humayum, 'the high door' or 'sublime porte', from which has been derived the well-known diplomatic phrase. Of the 379 mosques, the most remarkable are the royal mosques. First among these is the mosque of St. Sophia, the most ancient existing Christian church, converted into a mosque in 1453 on the capture of the city by the Turks. The city is indescribably dirty in certain parts, but of recent years many improvements have taken place, and it is yielding more and more to Western influences. There are numerous public baths and several great bazaars. The few manufactures are chiefly confined to articles in morocco leather, saddlery, tobacco-pipes, fez caps, arms, perfumes, and gold and silver embroideries. The foreign commerce is considerable. The harbour, the Golden Horn, is deep, well-sheltered, and capable of containing 1200 large ships, which may load and unload alongside the quays. It is about 6 miles long, and a little more than half a mile broad at the widest part. There are several graving-docks belonging to the Government but administered by a British company. The exports consist of silk, carpets, hides, wool, goats'-hair, and valonia. The suburb *Galata* is the principal seat of foreign commerce. Here are situated the arsenals, the dockyard, and the artillery barracks. *Pera* occupies the more elevated portion of the promontory of which Galata forms the maritime part. Constantinople occupies the site of the ancient Byzantium, and was named after Constantine the Great. It was taken in 1204 by the Crusaders, who retained it till 1261; and by the Turks under Mohammed II, 29th May, 1453—an event which completed the extinction of the Byzantine Empire. By the Treaties of Sévres (1920) and of Lausanne (1923) Turkey retained Constantinople, but Angora is now the capital. Pop. 673,029.—BIBLIOGRAPHY: R. Elston, *The Traveller's Handbook for Constantinople and Asia Minor*; E. Gibbon, *The Decline and Fall of the Roman Empire*;

Sir E. Pears, *The Destruction of the Greek Empire; Forty Years in Constantinople.*

Constantsa, a seaport, Romania, on the Black Sea. It exports timber, petro-

leum, and grain. The harbour has been greatly improved, and has now a depth of 28 to 29 feet. There is a special petroleum dock (depth, 29 feet), and in the outer harbour are two grain elevators. Pop. 27,662.

Constellations are the groups into which astronomers have divided the fixed stars. Ptolemy enumerated forty-eight constellations, which are still called the



Constellations and Chief Stars of the Northern Hemisphere, with those of the Southern Hemisphere which are adjacent to the Equator

leum, and grain. The harbour has been greatly improved, and has now a depth of 28 to 29 feet. There is a special petroleum dock (depth, 29 feet), and in the outer harbour are two grain elevators. Pop. 27,662.

Ptolemaean. They are the following: (1) The twelve signs of the zodiac (see *Zodiac*). (2) Twenty-one constellations found in the northern hemisphere—the Great Bear (*Ursa Major*), the Little Bear (*Ursa Minor*), Perseus, the Dragon (*Draco*),

Cepheus, Cassiopeia, Andromeda, Pegasus, the Little Horse (*Equuleus*), the Triangle (*Triangulum*), the Waggoner (*Auriga*), Boötes, the Northern Crown (*Corona Boreälis*), Ophiuchus, the Serpent (*Serpens*), Hercules, the Arrow (*Sagitta*), the Lyre (*Lyra*), the Swan (*Cygnus*), the Dolphin (*Delphinus*), the Eagle (*Aquila*). (3) Fifteen constellations in the southern hemisphere—Orion, the Whale (*Cetus*), Eridanus, the Hare (*Lepus*), the Great Dog (*Canis Major*), the Little Dog (*Canis Minor*), Hydra, the Cup (*Crater*), the Crow (*Corvus*), the Centaur (*Centaurus*), the Wolf (*Lupus*), the Altar (*Ara*), the Southern Fish (*Piscis Austrälis*), the Argo, the Southern Crown (*Coröna Austrälis*). Others were subsequently added; this being especially rendered necessary by the increased navigation of the southern hemisphere, and additional groups have been marked out associated with all sorts of animals and objects, including the Camelopard, the Fly, the Air-pump, and the Compasses. The different stars of a constellation are known by the letters of the Greek alphabet, α denoting generally the brightest star, β the next, and so on. The order is not, however, always rigorously observed.—Cf. E. W. Maunder, *Stars and how to Identify Them*.

Constipation is the retention of fæces associated with a sluggish action of the bowels. The chief causes are sedentary habits, constitutional peculiarities, certain diseases, e.g. anæmia, affections of the stomach, liver, and intestines, also injudicious drug-taking. The outstanding symptoms are debility and lassitude, with mental depression and loss of appetite, headache, furred tongue, and a 'muddy' appearance of the skin. The chief points to be observed in treatment are regular habits, exercise, abdominal massage, light diet, with abundance of fruit, vegetables, and oatmeal. Large quantities of water, hot and cold, should be taken, and, when necessary, the milder laxatives may be used.

Constitution, the fundamental law of a state, whether it be a written instrument of a certain date, as that of the United States of America, or an aggregate of laws and usages which have been formed in the course of ages, like the British Constitution. The chief kinds are: (1) Constitutions granted by the plenary power of absolute monarchs. (2) Those formed by

contract between a ruler and his people, the contract being mutually binding—a class under which, in a great degree, the British Constitution must be placed. (3) Those formed by a compact between different sovereign powers, such as the Constitutions of the former German Empire, of the United Provinces of Holland, and of the Swiss Confederation.

Consubstantial, an equivalent for the Greek term *homöousios*, the true signification of which disturbed the religious world early in the fourth century. The Athanasians, or Trinitarians, at the Council of Nice in 325, gave it the meaning indicated in the Nicene Creed, "*Of one substance with the Father*" (applied to Christ).

Consubstantiation, the mystical union of the body of Christ with the sacramental elements, according to the Lutherans and others, who maintain that, after the consecration of the elements, the body and blood of Christ are substantially present with the substance of the bread and wine.

Consul, a name originally given to the two highest magistrates in the Republic of Rome. After Tarquinius Superbus had been expelled (509 B.C.), two consuls were placed at the head of the Senate. These officers were annually elected, at first only from the patricians; at a later period (366 B.C.) also from the plebeians. In order to be eligible for the consulship, the candidate was to be forty-five years of age, and must have passed through the offices of quæstor, ædile, and prætor. The insignia of the consuls were a staff of ivory with an eagle at its head, a toga bordered with purple (*toga prætexta*), which under the emperors was embroidered; an ornamental chair (*sella curûlis*), and twelve *lictors*, who, with rods and axes (*fascæ*), preceded them. Under the emperors the consular dignity sank to a shadow and became merely honorary. The last consul at Rome was Theodorus Paulinus (A.D. 536).

The title of consul was revived in the French Republic after the Revolution of 9th Nov., 1799, and lasted until Napoleon was proclaimed emperor, 10th April, 1804.

At present *consuls* are officials appointed by the Government of one country to attend to its commercial interests in seaports or other towns of another country. The duties of a consul, generally speaking, are to promote the trade of the country he represents; to give advice and assistance

to his fellow-subjects when called upon; to uphold their lawful interests and privileges if any attempt be made to injure them; to transmit reports of trade to his own Government; to authenticate certain documents; to administer the Merchant Shipping Acts; &c. The consular service is now administered by the Overseas Trade Department of the Board of Trade. The annual consular reports on foreign trade are of extreme importance.

Consumption. See *Tuberculosis (Pulmonary)*.

Consumption is generally treated by modern writers on economics as a separate department of economics, distinct from and preceding production and distribution. The study of consumption is concerned with (1) wants in relation to the means of satisfying them, and to each other; (2) the reaction of the satisfaction of wants upon production. The basic conception in this study is that of utility in the widest sense, "the power or capacity [of goods and services] to satisfy desire or serve a purpose" (Mill); for, according to the utility of goods and services to him, the consumer regulates and distributes his consumption. An important distinction is between total and marginal (or final) utility. After a point, the utility obtained from the consumption of successive portions of a commodity diminishes. Thus, the total utility of a loaf of bread may be great, but the utility of the last slice eaten, i.e. the marginal utility, may be small. Consumption is sometimes characterized as productive or unproductive, according as it does or does not directly conduce to the efficiency of a producer and to further production. Thus, the wealth expended on art, fine clothing, higher education, may be regarded as unproductively consumed. The classification is unsatisfactory, however, the distribution lying mainly in the degree or directness with which the act of consumption is related to production. Thus, the moral and creative benefit of art to the community may indirectly increase efficiency in production. Similarly, expenditure on war and armaments may be productive consumption, by ensuring security and the stability of commercial conditions. Consumption being the end and object of all production, in general the demand of the consumer determines how the various agents of production

(land, labour, capital) are employed. Production may, however, considerably influence consumption owing to (1) the production of a new article creating a new want; (2) scarcity or abundance leading to changes in the quantity or method of consumption. See *Economics; Free Trade*.—Cf. P. H. Wicksteed, *Alphabet of Economic Science*.

Contagious Diseases (Animals) Acts, British Acts of Parliament passed in order to prevent the spread of contagious diseases among cattle, sheep, and pigs. The Act of 1869 and later ones were consolidated by a general Act of 1894. Owners of diseased animals (the diseases include anthrax, cattle-plague, pleuropneumonia, foot-and-mouth disease, and swine fever) must at once isolate them and notify the police, who notify the Ministry of Agriculture. On the report of an inspector, the Ministry or local authority may declare a place, with all lands and buildings contiguous, to be an affected place. They may also declare a still wider extent of the surrounding district an infected *area*. The Ministry is also empowered to make arrangements respecting transit of infected cattle, and may order the slaughter of all animals affected with disease, and all animals that have been in the same stable or shed with infected animals, and even all animals suspected of disease, and all animals within the area declared infected. Provision is made for compensation to owners of slaughtered animals. The mode of ascertaining compensation is laid down in the Animals Amendment Order of 1904. Power is also given to the Ministry to issue orders prohibiting the landing of animals, fodder, &c., from a foreign country; and to appoint ports at which alone foreign animals may be landed. Penalties are imposed for offences against the Acts.

Contango, in stock-jobbing, a sum of money paid to a seller for accommodating a buyer, by carrying the engagement to pay the price of shares bought over to the next account day. In reality contango is interest paid for the loan of money for fourteen days, that is, for the interval between account days.

Contempt, an offence against the dignity, order, or authority of a court or legislative assembly. Contempts committed out of court may be punished by fine or imprisonment; contempts done

before court are usually punished in a summary way by commitment or fine.

Contour, or **Contour-line**, in physical geography, a line drawn on a map through all the points which are at a given height above sea-level. If we imagine sections of the country to be made by horizontal planes at stated equal distances from one another of, say, 50 feet, then the contour-lines are the bounding curves of these sections. In a map these curves, with their levels marked on them, are shown projected on a horizontal plane, but they are not altered in shape or size by the projection. Near a mountain peak the contours are small ovals, gradually contracting to a point directly beneath the summit. The contours on a map give an engineer or military commander valuable information. By the scale of the map horizontal distance is found, and by a combination of this information, and the knowledge gained from the contours, it is possible to find the gradient between two points.

Contraband, in commerce, all goods and wares exported from or imported into any country, against the laws of that country. There are, also, a number of articles termed *contraband of war* which neutrals may be prevented, by one belligerent, from carrying to another. These generally include not only arms and munitions of war, but all the articles out of which they may be made. In recent times even provisions in certain cases have been considered contraband of war.

Contract, in law, an agreement or covenant between two or more persons, in which each party binds himself to do or forbear some act, and each acquires a right to what the other promises. It thus involves not a mere promise but an obligation at law. Contracts may be in express terms or implied from the acts of the parties; they may be verbal or written, and at common law both forms are binding; but by statute law some promises must be in writing. There are many contracts which are not obligatory unless reduced to writing, as, for example, those dealing with the sale of land, or leases for more than three years in England or more than one year in Scotland. To be valid, a contract must be entered into by parties legally competent, that is, of sound mind and of full age. The act contracted for must not be contrary to law or public

policy. Thus an agreement to do injury to another, or a contract not to marry at all (except in the case of a widow) is void. A contract is voidable if obtained by fraud, mistake, or compulsion.—**BIBLIOGRAPHY**: S. M. Leake, *Principles of the Law of Contract*; Sir F. Pollock, *Principles of Contract*.

Contract Note, a note given by a stockbroker to a client informing him of a transaction or transactions carried out on his behalf, and stating the amount of his commission. The British stamp duties on Contract Notes are on a graduated scale, and are from 6*d.* for stock or security valued at £5 and not exceeding £100, 1*s.* above £100 to £500, and so on to a maximum of £1 for over £20,000.

Conversano, a town in South Italy, province of Bari, with a trade in wine, oil, almonds, flax, and cotton. Pop. 15,100.

Conveyancing, the practice of drawing deeds, leases, or other writings (*conveyances*) for transferring property, or an interest therein, from one person to another, of investigating the title of the vendors and purchasers of property, and of framing those multifarious deeds and contracts which govern and define the rights and liabilities of families and individuals.—Cf. Sir H. W. Elphinstone, *Introduction to Conveyancing*.

Convocation, an assembly of the clergy or of the graduates of certain universities. In England the name is specifically given to an assembly of the clergy belonging either to the province of Canterbury or to that of York, to consult on ecclesiastical matters. Convocation was indefinitely prorogued in 1717, and was not resuscitated until 1852.

Convolvulaceæ, a natural order of gamopetalous dicotyledons, comprising about 700 species, of which convolvulus is the best-known genus.

Convolvulus, a genus of plants, type of the nat. ord. Convolvulaceæ, consisting of slender twining herbs with milky juice, bell-shaped flowers, and five free stamens. Some British species are commonly known as bindweeds; others are cultivated in gardens. *C. tricolor*, or minor convolvulus, with its large flowers of violet-blue with white and yellow centre, is a familiar species.

Convoy, a fleet of merchantmen under the protection of a ship or ships of war, or the ship or ships appointed to conduct

and defend them from attack and capture by an enemy. The rules as to convoys have been laid down by the London Convention on the Laws and Customs of Naval War (1908-1909).

Convulsion is an involuntary contraction usually violent in nature, the result of muscular spasm, and popularly known as a *fit*. Children of a nervous or unstable type frequently suffer from convulsions as the result of teething, intestinal upset, worms, &c., or at the onset of some serious illness, e.g. pneumonia. Convulsions may be, on the other hand, the direct sign of brain disease, seen in brain tumour, fractured skull, and epilepsy, or may arise in the course of other diseases, as in puerperal fever, or in the uræmic convulsions of renal disease.

Conway, Moncure Daniel (1832-1907), American writer. His writings include works on Carlyle, Emerson, and Hawthorne; *Demonology and Devil Lore*; *The Wandering Jew*; *The Life of Thomas Paine*; and an edition of his works; and an *Autobiography*.

Conway, Sir William Martin (1856-), writer on art and traveller. He was several years professor of art at University College, Liverpool, and Slade professor of fine arts at Cambridge (1901-1904). He has made extensive explorations in Spitzbergen, the Himalayas, and the Andes, making ascents of Sorata, Illimani, Aconcagua, &c. He is author of *Early Flemish Artists*, *The Alps*, *The Abbey of St. Denis*, and *Art Treasures of Soviet Russia*. He was created a Baron in 1931.

Conway, or **Aberconway**, a town of North Wales, in Carnarvonshire, at the mouth of the Conway. It is notable for its old castle built by Edward I. Pop. (1931), 8769. The River Conway has a course of about 30 miles. The main harbour is at Deganwy Quay, where there is a railway dock (depth, 14 feet) with facilities for loading direct from trucks. The principal export is slate.

Cooch-Behar, a native state in India, in political relation with the government of Bengal. It forms a well-watered and extensively cultivated alluvial plain. Rice is the chief product. Area, 1318 sq. miles; pop. 592,489. The chief town is Cooch-Behar; pop. 10,840.

Cook, Eliza (1818-1889), English poet. She is chiefly remembered as the author of *The Old Armchair*.

Cook, James (1728-1779), British navigator. In 1755 he entered the Royal Navy. In 1768 he was put in command of a scientific expedition to the Pacific. In the *Endeavour* he visited New Zealand, discovered New South Wales, and returned by the Cape of Good Hope to Britain in 1771. In 1772 Captain Cook commanded a second expedition to the Pacific and Southern Oceans. He returned to Britain in 1774. Two years later he again set out on an expedition to ascertain the possibility of a north-west passage. On this voyage he explored the western coast of North America, and discovered the Sandwich Islands, on one of which, Hawaii, he was killed by the natives.—**BIBLIOGRAPHY**: A. Kippis, *Narrative of the Voyages round the World performed by Captain James Cook*; A. Kitson, *Captain James Cook, the Circumnavigator*.

Cook, Thomas (1808-1892), founder of the great tourist agency of Thomas Cook & Son. He began operations with short tourist trips from Leicester, where he resided, gradually increasing the length and number of his excursions; then removed to London (1865). Under the direction of his son, John Mason Cook (d. 1899), the operations of the firm may be said to have extended to the whole world.

Cook Islands, a group of islands in the Pacific Ocean, administered by New Zealand. Total area (with other islands), 280 sq. miles; pop. (1926), 13,877. Rarotonga, the chief island, exports fruits, coffee, and copra. See *Hervey Islands*.

Cook's Inlet, an inlet of the North Pacific Ocean, running into the territory of Alaska for about 150 miles.

Cook Strait, the channel which separates the two principal islands of New Zealand.

Cooktown, chief port in North Queensland, on the Endeavour River. It is the centre of a sugar-cane district, is connected by rail with the Palmer gold- and tin-mines, and has good pearl and beche-de-mer fisheries. Sandal-wood is exported. Pop. 1257.

Coolgardie, a gold-mining town in the interior of Western Australia, which has risen up since the gold discoveries of 1891. It may be reached by railway both from Fremantle and Albany. The water-supply is led for 328 miles through iron pipes. Pop. 2533; of district, 15,000.

Coolidge, Calvin (1872-1933), thirtieth President of the United States of America. A lawyer by profession, he became a member of Senate in 1912, and was President of the Senate in 1914 and 1915. From 1916 to 1918 he was Lieutenant-Governor of Massachusetts, and Governor in 1919 and 1920. In 1921 he became Vice-President of the United States, and succeeded as President on the death of President Harding in 1923. He was re-elected President in 1924, and retired in 1929. He was a Republican.

Coolie, a name in India for a day labourer, also extended to those of some other Eastern countries. Many of these have been introduced into the West Indies, Mauritius, and other places. The first coolie emigrants appear to have been those sent to British Guiana from Calcutta in 1839. Coolies have also been introduced into Jamaica, Trinidad, Natal, and large numbers into Mauritius, the Indian population of this island being over 260,000. Many thousand Chinese labourers have been introduced to work in the gold-mines of the Transvaal. Coolie labour is also employed in Cuba, Peru, and Tahiti.

Cooling-towers are structures used for cooling the circulating water used for condensing purposes in power plants which are situated away from natural sources of cold water. The towers, of wood or steel, are 60 feet to 70 feet high, and about 30 feet by 40 feet in cross-section. The interior is packed with wooden hurdles, laths, and distributing trays for spreading the water. The circulating water is pumped to a height of about 30 feet, where it enters the cooling-tower. The vapours rising from the hot water create a powerful draught of cold air from the bottom upwards through the tower. This cold air meets the descending spray of hot water and cools it, and the water falls as a kind of cold rain into the pond beneath, from which it is pumped to the condensers and again heated by them.

Coomassie. See *Kumasi*.

Coomptah, a seaport of India, Presidency of Bombay. It has an open roadstead and a large cotton trade. Pop. 10,629.

Cooper, Sir Astley Paston (1768-1841), English surgeon. He was appointed professor of anatomy at Surgeons' Hall, and in 1800 head surgeon of Guy's Hospital. In 1822 appeared his great work on *Dis-*

locations and Fractures. His other works include: *The Principles and Practice of Surgery*, and *Anatomy of the Breast*.

Cooper, James Fenimore (1789-1851), American novelist. He wrote numerous novels dealing with life on the sea and in the backwoods, most of which, like *The Pilot*, *Red Rover*, *Waterwitch*, *Pathfinder*, *Deer-slayer*, and *Last of the Mohicans*, are well known.—Cf. M. E. Phillips, *James Fenimore Cooper*.

Cooper, Thomas Sidney (1803-1902), English landscape and cattle painter. He produced a long series of works, such as *River Scene*, *Cow and two Sheep* (both in the National Gallery), and many others.

Co-operation. The co-operative movement has two distinct sides: (1) co-operation in production, and (2) co-operation in distribution. In (1), capital and labour are so united that the worker has the control and the management of the factory, is the owner of the instruments of production, and the profits are divided up among the workers. Up to the present time producers' co-operation cannot be held to be of much practical account. It, or some development of it, is an ideal of both syndicalism (q.v.) and guild socialism (q.v.). (2) Co-operation in distribution has been very successful in Great Britain. It is a system in which the consumer is the proprietor and employer, thus doing away with the middleman, and the profits are divided among the shareholders, i.e. the consumers, in proportion to the amount of their purchases.

Early co-operative societies were in existence at the end of the eighteenth century, but it is to the teaching of Robert Owen that co-operation owes its establishment. The formation of the Rochdale Pioneer Society in 1844 marks the point at which the movement first took definite shape. The Rochdale pioneers were a group of twenty-eight weavers who gathered together in very small amounts a capital of £28, with which they opened a store to supply flour, butter, sugar, and oatmeal. They limited interest on shares to 5 per cent, and divided proceeds in proportion to purchases. It is important as being the model for all similar societies in the north of England and Scotland. The success of the movement was remarkable, and it spread with marvellous rapidity. To meet the needs of the various retail societies two wholesale societies—

one in Manchester (1864) and one in Glasgow (1869)—were formed. They work practically as one institution. They have purchasing depots all over Great Britain, the United States, Spain, Denmark, and Germany. As well as arranging for the purchasing of goods, the Co-operative Wholesale Society has branches purely for production. Within the last fifteen years the C.W.S. has extended its activities in all directions. It has been found that the system can be adapted to suit and undertake production at any stage. The European War showed that in order to control prices, the control of raw material was also necessary, and this the C.W.S. is undertaking. It is now a huge trading concern of ever-increasing power.

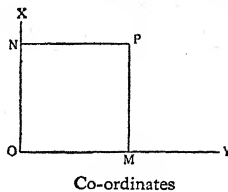
In 1921 the English Wholesale Society had 1205 members, a total capital of £23,287,747; its sales amounted to £81,941,682. The Scottish Wholesale Society had 273 members, with a capital of £5,694,379, and sales of £22,041,158. The retail societies numbered 1352, with a membership of 4,548,557; its sales amounted to £218,780,384; with £14,253,671 profit.

Agricultural co-operation takes place for a variety of objects, and one society may have more than one distinct function. Its development, unlike that of co-operation in other spheres, does not obey the same general law in each country. The Agricultural Organization Society in Great Britain was founded in 1901, and is a many-sided concern. From 1905 to 1920 the agricultural aspect of co-operation developed greatly. In Germany, Switzerland, Denmark, France, Italy, and Belgium, and to a much less extent in Ireland, the agricultural co-operative movement was established by 1907. Between 1910 and 1920 it had spread and was developing in the United Kingdom, Norway, Sweden, Finland, and Siberia. Great progress has been made in co-operative banking and in the formation of co-operative credit societies in Germany and other Continental countries.

Cooper's Creek, or the Barcoo, called by the latter name chiefly in its upper course, the largest inland river of Australia, which rises in Queensland by two branches, the Thomson and Victoria (or Barcoo), and flows south-west to Lake Eyre.

Co-ordinates, in geometry, a term applied to magnitudes which fix the position of a point in a plane or space. If,

from a point P, lines PM and PN be drawn parallel to two fixed intersecting lines OX and OY, the lengths PM and PN, usually denoted by x and y , fix the position



of P, and are called its co-ordinates. Many other systems besides this are also used. The method of co-ordinates for dealing with geometrical problems was in-

vented by Descartes.

Coorg, a province of India, adjacent to and administered by the resident of Mysore; area, 1582 sq. miles. The country has a healthy climate, and yields coffee, spices, and timber. The capital is Merikara. Pop. 163,838.

Coot, an aquatic bird of the rail family (Rallidæ), frequenting lakes and ponds. The common coot (*Fulica atra*) has a bald forehead, a black body, and lobated toes, and is about 15 inches in length. The nests, which are very large, strong, and compact, are composed of reeds and rank water-herbage, built sometimes near the water's edge, and sometimes on small islets at some distance from the shore. Should the nest be set adrift by a rise of water, the female coot seems in nowise disturbed, but sits composedly on her eggs until it is stranded.

Copaiba, or Copaiva, the name of a balsam and an oil. The balsam is a liquid resinous juice flowing from incisions made in the stem of a plant, *Copaifera officinalis* (nat. ord. Leguminosæ), and several other species of the genus, growing in Brazil, Peru, &c.

Copais, a lake of Greece, in Bœotia, enclosed by mountains on every side, and forming a shallow expansion of the River Cephissus. The area (53,000 acres) has been drained and is now under cultivation.

Copal is a gum-resin yielded by different trees in Africa and South America, and differing according to its origin; but in general it is hard, shining, transparent, and citron-coloured. When prepared it is much used for varnishes. A substance called *fossil copal* or *copalin* is found in some places.

Copenhagen, the capital of Denmark,

on the Sound, the larger and older portion of it on the Island of Zealand, a smaller portion on the Island of Amager, with between them a branch of the sea forming the harbour. It has a citadel and several strong forts protecting it on the sea side. There are many fine buildings, including several palaces, an ancient castle, and the Royal Library. Copenhagen is especially famous for its educational institutions. The university, founded in 1479, has about 100 professors and teachers, and 3000 students. The harbour is safe and commodious, and there are no tides. There is accommodation for ships drawing up to 36 feet, and ample cargo and repair facilities of all kinds are provided. Ships bunkering pay no dues. Copenhagen is the principal station of the Danish fleet and the centre of the commerce of Denmark. A free port was established about 1890. It carries on an active trade with Norway, Sweden, Russia, and Germany, and in particular with Britain, the principal exports being grain, butter, cheese, beef, pork, cattle, horses, and hides. It has foundries and machine-works, textile-mills, porcelain-works, breweries, distilleries, and sugar-refineries. Pop. (1925), 587,150, with suburbs, 731,496.—Cf. E. C. Hargrove, *The Charm of Copenhagen*.

Copepoda, an order of minute entomostracous fresh-water and marine crustacea, so named because their five pairs of feet are mostly used for swimming. They form an important part of the floating population (plankton) of the sea and lakes, and furnish food to many fishes.

Copernicus, or **Kopernigk**, Nicolaus (1473–1543), Polish astronomer. In 1500 he went to Rome, where he taught mathematics and astronomy. In 1505 he left Italy for Prussia to carry out the work of his life. Doubting that the motions of the heavenly bodies could be so confused and complicated as the Ptolemaic system made them, he was induced to consider the simpler hypothesis that the sun was the centre round which the earth and the other planets revolve. Besides this fundamental truth Copernicus anticipated many other of the principal facts of astronomical science, such as the motion of the earth round its axis, and the immense distance of the stars. His general theory also enabled him to explain for the first time many of the important phenomena of

nature, such as the variations of the seasons and the precession of the equinoxes. His great work, *De Orbium coelestium Revolutionibus*, was published at Nürnberg in 1543.

Copiapó, a river, a town, and a seaport of Chile. The river flows west from the Andes to the Pacific, and has a course of 120 miles. About 30 miles from the sea is the town of Copiapó, capital of Atacama province, the centre of an important mining district. It is connected by rail with its port Caldera. Pop. 11,600. The small seaport Porto Copiapó stands in the mouth of the river.

Copley, John Singleton (1737–1815), English historical painter. His most celebrated picture is *The Death of Chatham*, now in the National Gallery.

Coppée, François Édouard Joachim (1842–1908), French poet, novelist, and dramatist. He wrote: *Les humbles* (1872), *Le cahier rouge* (1874), *L'arrière-saison* (1890), and *Dans la prière et la lutte* (1901). Among his plays are: *Severo Torelli* (1883), *Les Jacobites* (1885), and *Pour la couronne* (1895). His novels include: *Toute une jeunesse* (1890), wherein he told his own story; and *Le coupable* (1897).

Copper, one of the most anciently known metals, is a metal of a pale-red colour tinged with yellow; chemical symbol, Cu; atomic weight, 63.6. Next to gold, silver, and platinum it is the most ductile and malleable of metals; it is more elastic than any metal except steel, and the most sonorous of all except aluminium. Its conducting power for heat and electricity is inferior only to that of silver. It has a distinct odour and a nauseous metallic taste. It is not affected by water, but tarnishes on exposure to the air, and becomes covered with a green carbonate. It occurs native in branched pieces, dendritic, in thin plates, and rarely in regular crystals, in the primitive and older secondary rocks. Blocks of native copper have sometimes been got weighing many tons. Its ores are numerous and abundant. Of these several contain sulphur and iron or other metal, such as copper glance or vitreous copper (Cu_2S); grey copper or Fahlerz, one of the most abundant and important ores; and copper pyrites or yellow copper ore (CuFeS_2), the chief commercial ore. The red oxide of copper (Cu_2O) forms crystals of a fine red colour, and is used

for colouring glass. Copper is found in most European countries, in Australia and Japan, in Africa (especially in the Belgian Congo), and in North and South America. In Britain the mines of Cornwall now yield very little. Copper is extracted from its ores either by the dry or the wet process. Copper is obtained by smelting the ore, first to a matte, which consists of a mixture of copper sulphide and iron sulphide. For coarse ores this is carried out in a blast-furnace; for fine ores large reverberatory furnaces are used. The matte thus produced is poured in the molten state into a converter. This oxidizes the sulphur, which escapes as gas, and also oxidizes the iron, and the iron oxide formed combines with the silica of the lining or added silica to form a slag. The metallic copper obtained is refined either in a refining furnace or by an electrolytic process, in which the crude metal serves as an anode and a strip of pure copper as cathode. In extracting the metal from pyrites by the wet process, the ore is first roasted to get rid of the larger proportion of sulphur, then the calcined residue still containing sulphur is mixed with common salt, ground, and heated in furnaces. The copper is thus converted into chloride, part of which volatilizes, but is condensed by passage through flues and water-condensers. After some hours the calcined mixture is raked out of the furnace, cooled, and transferred to tanks, where it is exhausted by successive treatment with water. The solution, containing chloride of copper, sulphate and chloride of sodium, and iron salts, is next heated along with scrap-iron. Copper precipitates in the form of a ruddy, lustrous, tolerably compact mass, with a crystalline appearance, and mixed with metallic-iron and oxide. The larger pieces of iron are picked out, the precipitate washed and drained, and then melted and refined. Copper is of great commercial value. The world's production of copper amounts to about 1,000,000 tons per annum, the U.S.A. producing more than half, the Belgian Congo coming next (c. 60,000 tons).

Copperas, sulphate of iron or green vitriol ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$), a salt of a peculiar astringent taste and of a fine green colour. It is much used in dyeing black and in making ink.

Copper-head, or **Moccasin Snake**, a venomous North American serpent, the

Agkistrodon contortrix of the rattlesnake family.

Coppermine River, a river in Mackenzie, Canada. After a course of 250 miles it falls into Coronation Gulf.

Copper-nickel, or **Kupfernickel**, a hard copper-red ore of nickel, NiAs, found in Saxony and elsewhere. Nickel comes almost entirely from the garnierite of New Caledonia and the Canadian nickeliferous pyrrhotines.

Copper Pyrites, or **Chalcopyrite**, the commonest ore of copper in most mining districts, a joint sulphide of copper and iron, CuFeS_2 , with 33 per cent of copper. It is sometimes brilliantly iridescent on the surface (peacock ore).

Coprolites, properly the fossil excrement of reptiles or fishes, or indeed of other organisms. The term has also been applied for trade purposes to phosphatic concretions, such as those in the Red Crag of England. Their high percentage of calcium phosphate, amounting sometimes to 65 per cent, renders them serviceable as fertilizers for agricultural use.

Coptic Language. The Coptic language belongs to the Hamitic group of African languages. It was spoken from the third to the sixteenth century, but is now extinct as a vernacular. There is an abundant Coptic Christian literature, consisting chiefly of homilies and lives of saints.

Copts, a name given to the Christian descendants, supposed to be the purest representatives, of the Ancient Egyptian race, belonging mostly to the Jacobite or Monophysite sect. At present they number about 700,000. In various respects they resemble the Moslem, and they practise circumcision and abhor the flesh of swine. The women go out with veiled faces, like the Moslem women. The head of the Coptic Church is the Patriarch of Alexandria, who is also head of the Abyssinian Church. He is regarded as the successor of St. Mark, by whom the Copts believe that Christianity was introduced among them.

Copyhold, in English law, a tenure of land by copy from the Court Rolls belonging to a manor. By the Law of Property Act, 1922, all copyholds are converted as from 1st January, 1926, into freeholds. See *Freehold*.

Copyright. Under the rules of common law copyright existed only in respect of

unpublished works. At the moment when publication had been made, the right to multiply that work lay open to the world. The first attempt to remedy this injustice was made by an Act of 1709, and this Act was followed by a series of statutes. The Copyright Act (1911), which came into force on 1st July, 1912, the Musical Copyright Acts, 1902 and 1906, and sections 7 and 8 of the Fine Arts Copyright Act, 1862, are the principal statutes which embody the present law of British copyright.

Copyright is defined as "the sole right to produce or reproduce any" original literary, dramatic, musical, and artistic "work or any substantial part thereof in any material form whatsoever; to perform or, in the case of a lecture, to deliver a work or any substantial part thereof in public; if the work is unpublished to publish the work or any substantial part thereof", and includes the right of translation, dramatization, and conversion into a novel, record, or film. The term 'original' is hardly capable of definition, and there may be copyright in such productions as a guide-book or a time-table. 'Literary work' includes maps, charts, plans, tables, and compilations; 'dramatic work' includes recitations, choreographic work, and plays without words; 'artistic work' includes painting, drawing, sculpture, architecture, and artistic craftsmanship.

In literary, dramatic, and artistic works copyright in the case of a published work subsists during the life of the author and for fifty years thereafter; in the event of joint authorship, during the life of the author who first dies and for fifty years thereafter or for the life of the survivor, whichever period is the longer; and in the case of a work unpublished, unperformed, or undelivered at the death of the author or surviving joint author, until publication and for a term of fifty years after publication, performance, or delivery; in a photograph, for fifty years from the making of the negative; and in mechanical sound-producing instruments, for fifty years from the making of the plate.

On the expiry of twenty-five years (in the case of a work copyright at the passing of the Act thirty years) after the death of the author, and in joint authorship on the expiry of twenty-five (or thirty) years from the death of the first deceasing

author, or after the death of the surviving author, whichever period is the shorter, a person may without infringement reproduce a published work for sale after notice in writing of his intention and provided he pays to the owner of the copyright a royalty of 10 per cent on the published price of all copies sold.

The publisher of every book published in the United Kingdom must, within one month after publication, deliver a copy to the British Museum, and must, if required within one year after publication, deliver a copy within one month of the demand or the publication, whichever is the later, to each of these libraries: the Bodleian Library, Oxford; the University Library, Cambridge; the Advocates' Library, Edinburgh (now the National Library of Scotland); and Trinity College, Dublin; and, subject to qualifications, to the National Library of Wales.

The Act applies in its main provision not only to the British Isles but also to Australia, Canada, the Union of South Africa, New Zealand, Newfoundland, India (as modified by the Indian Copyright Act, 1914), the non-self governing Dominions, the British Protectorates, and Cyprus.

As regards international copyright the Revised Berne Convention of 1908 has been ratified by and is now in force in Great Britain, her Colonies and Possessions, France (including Algeria and other colonies), Syria and Lebanon, Belgium, Italy, Germany, Denmark, Japan, Norway, Sweden, Spain and the Spanish Colonies, Switzerland, Portugal and the Portuguese Colonies, the Netherlands and the Dutch Colonies, Luxembourg, Monaco, Tunis, Haiti, Austria, Brazil, Bulgaria, Czechoslovakia, Danzig, Palestine, Greece, Hungary, Liberia, Morocco (excluding the Spanish zone). In some of these countries the Convention was ratified with some reservations.

Coquelin, Benoît Constant (1841-1909), French actor known as *Coquelin aîné*. He made his debut at the Comédie Française in 1860. In 1897 he produced Rostand's *Cyrano de Bergerac* in Paris.

Coquimbo, a town of Chile, capital of the province of Coquimbo. Pop. 6330.—*Porto Coquimbo*, the port of the above, has smelting-works and a large export trade, chiefly in copper and the precious metals. It accommodates ships drawing 30

feet, and is a coaling-station. Pop. 7300.—The province (14,098 sq. miles) is rich in copper, silver, gold, and other metals, and is mountainous. Pop. 160,256.

Coral, the name applied to the calcareous stony structures secreted by many of the Actinozoa (sea-anemones, &c.) which form one of the divisions of the coelenterate zoophytes, and also applied to the animals themselves. Two kinds of corals are distinguished by naturalists, *sclerodermic* and *sclerobasic*. The coral masses grow not merely by the multiplication of individuals, but by the increase in height of each of the latter, which, as they grow, become divided transversely by partitions. The animal, distended with ova, collapses on their discharge, and thus becomes too small for the cup which it formerly occupied; it cuts off the waste space by a horizontal layer of coral, and the repetition of this process gradually adds to the height of the mass.

Coral reefs appear under three principal types, namely, the *fringing reef*, the *barrier reef*, and *atoll* or *lagoon reef*.

The coral of commerce is the production of various polyps, and is of different colours and internal structure. The red, pink, and black sorts are the most highly prized. The red coral has a branching shrub-like form, and, as well as other sorts, is found abundantly in the Mediterranean. The principal Mediterranean coral fishery lies round the south-west coast of Corsica, where the finest quality is found, the coast of South Italy, and the north coast of Africa (Algeria and Tunis). Italy takes the leading part both in fishing for coral and in its preparation for the market. The finest tints of rose-pink coral fetch from £80 to £120 an ounce.—Cf. C. Darwin, *The Structure and Distribution of Coral Reefs*.

Coralline Crag, a name for the lowest division of the Pliocene strata in the east of England, derived from the numerous and beautifully preserved polyzoa, once called corallines, included among its fossils. The beds are mostly unconsolidated shelly sands.

Coral Rag. See *Jurassic System*.

Coral Sea, part of the Pacific on the north-east of Australia.

Corbeil, a town of France, department of Seine-et-Oise, where the Essonne enters the Seine. It has a large trade in grain and flour. Pop. 10,746.

Corber, Richard (1582–1635), English bishop and poet. He had a life-long reputation as a wit, jester, and convivial spirit, and was on intimate terms with Ben Jonson. His poems are mostly satiric and humorous; the best known is a lament for the fairies (*Fairies' Farewell*).

Corday d'Armont, Marie Anne Charlotte, commonly called Charlotte Corday (1768–1793), French revolutionary. Having obtained an interview with Marat at his own house, she plunged a dinner-knife into his side, and gave herself up to the attendants who rushed in at his cries. She was condemned to the guillotine and executed.

Cordeliers, the name given to a club or society of Jacobins, including Marat, Danton, and Camille Desmoulins. The club lasted from 1792 to 1794.

Corderius (Mathurin Cordier) (1479–1564), French schoolmaster. He taught at Paris—where he had Calvin as a pupil—and elsewhere in France; passed into Switzerland and taught at Geneva, where he died. He produced various school-books, the best known being *Colloquia Scholastica*.

Cordite, a smokeless explosive, consisting of 58 per cent nitro-glycerine, 37 per cent gun-cotton, and 5 per cent vaseline. Cordite M.D. (i.e. modified cordite) carries less than 30 per cent of nitro-glycerine, with a corresponding increase of nitro-cellulose. The cordite, which is like yellow gutta-percha in appearance, is wound on reels, and is afterwards cut up in lengths suitable for the various cartridges. Cordite is in some ways less satisfactory than other explosives, as it develops great heat and causes erosion; but it is the most stable explosive both chemically and ballistically in all climates, hot and cold. It is therefore the most suitable for use in the British Empire. Wet cordite can be fired; moisture does not deteriorate it. As it is somewhat difficult to ignite, an 'igniter' of black gunpowder is put into the gun cartridges to extend the flash of the firing-tube. In the open air it burns quietly.

Cordoba, an ancient Spanish city on the Guadalquivir, in Andalusia, capital of a province of the same name. The town is well supplied with schools, hospitals, and other institutions. Under the Moors the leather manufactured here (cordovan) was exported in all directions. At present

gold and silver wares, pottery, and cloth are manufactured. Cordoba was the first Roman colony in Spain. Under the Moors, after 756, it became the capital of Arabian Spain and the centre of Arabian splendour, as well as of learning, art, science, and industry under the caliphs of the West. Pop. 74,744.—The province includes the fertile and beautiful valley of the Guadalquivir and the mountains of Sierra Morena. Area, 5299 sq. miles; pop. 573,199.

Cordoba, a town of the Argentine Republic, capital of a province of the same name. There are many fine buildings, and the city is thoroughly modern. The university was founded in 1613. Cordoba is an important railway junction. Pop. 134,935.—The province has an area of 66,912 sq. miles, a pop. of 805,940, and produces gold, silver, graphite, copper, lead, salt, cereals, and timber.

Cordoba, a town of Mexico, state of Vera Cruz, in a fertile district rich in coffee plantations. Pop. 9600.

Corelli, Marie (1864–1924), British novelist. Her works include: *The Sorrows of Satan*, *The Mighty Atom*, *The Murder of Delicia*, *The Master Christian*, *God's Good Man*, *Holy Orders*, *The Life Everlasting*, and *The Young Diana*.

Corentyn, or **Courantyne**, a river of South America, separating British and Dutch Guiana. It has a course of 300 miles, and is navigable for 150 miles.

Corfu, the most northerly of the Ionian Islands, at the mouth of the Adriatic, near the coast of Albania; area, 275 sq. miles. It forms, with some minor islands, a nomarchy of Greece. The climate is pleasant and healthy, the soil fertile, and oranges, citrons, grapes, honey, wax, oil, and salt are abundant. Olive-oil and wine are the chief exports. Pop. 122,492.—**Corfu**, the capital, is finely situated, and has a good harbour (with safe anchorage in 15 fathoms) and considerable trade. Pop. 27,175.—Cf. S. Atkinson, *An Artist in Corfu*.

Coriander (*Coriandrum sativum*), an umbelliferous plant, native of Italy, and cultivated in other parts of Europe. The whole plant has an unpleasant smell, but the fruit, improperly called seed, is very agreeable and aromatic when dry. It is used as a carminative and aromatic in medicine, and as an ingredient in cookery and confectionery.

Corigliano, a town of Southern Italy,

province of Cosenza. It trades in wine and oil. Pop. 16,338.

Corinna, surnamed Myia ('The Fly'), an ancient Greek poetess, contemporary with Pindar (about 500 B.C.), whom she is said to have conquered five times at musical contests. Only a few fragments of her songs have come down to us.

Corinth, a once celebrated city upon the isthmus of the same name, which unites Peloponnesus with Northern Greece. It was renowned among the cities of Greece, and commanded by its advantageous position a most important transit trade. Only a few ruins remain to attest its ancient magnificence. It had two harbours, Lechæum on the west side of the isthmus, on what is now the Gulf of Lepanto, and Cenchrea, on the Gulf of Athens or Ægina. St. Paul lived there a year and a half, and two of his epistles are addressed to the Corinthians.

Corinth, Gulf of, or **Gulf of Lepanto**, a beautiful inlet of the Mediterranean, about 80 miles long, between the Peloponnesus and Northern Greece.

Corinth, Isthmus of, the isthmus which connects the Morea (Peloponnesus) with Northern Greece, varying in width from 4 to 8 miles. A canal about 4 miles long was constructed across the isthmus between 1882 and 1893. The depth is 26 feet; bottom width, 69 feet; top width, 80 feet 8 inches.

Corinthians, Epistles to the, two epistles addressed to the Church at Corinth about A.D. 57 or 58, which have been admitted as genuine writings of St. Paul by even the most critical assailants of the New Testament canon. They are most instructive from the insight which they furnish into the character of St. Paul himself, and the constitution, parties, and heresies of the Apostolic Church.

Corinto, a seaport, Nicaragua, Central America, on the Pacific. It has a large trade in coffee and hard woods. It can accommodate ships drawing 20 to 27 feet. Pop. 3000.

Coriolanus, Gaius Marcius, Roman legendary hero. He was banished for seeking to deprive the plebeians of the tribuneship, and took refuge amongst the Volsci, the bitterest enemies of Rome. The Volscian army encamped in sight of Rome before troops could be raised for the defence. The Roman Senate made unavailing overtures for peace, till at length the tears of

Veturia, his mother, and Volumnia, his wife, induced Coriolanus to withdraw his army from before Rome. He was afterwards assassinated. The story of Coriolanus forms the subject of one of Shakespeare's plays.

Corisco, an island belonging to Spain, situated in the Gulf of Guinea, West Africa. Area, $5\frac{1}{2}$ sq. miles; pop. 1500. Should Spain desire to sell Corisco, France has acquired the right to have the first refusal.

Cork, Richard Boyle, Earl of (1566-1643), English statesman. As clerk of the Council of Munster he distinguished himself by his talents and activity, and became successively a knight and Privy Councillor, Baron Boyle of Youghal, and finally, in 1620, Viscount Dungarvan and Earl of Cork. He was an able and energetic ruler, introducing many useful arts and manufactures amongst the people.

Cork, the largest and most southerly county in the Irish Free State; area 1,841,035 acres, of which less than a fourth is under crops. The west part is mountainous, the north and east very fertile. The coast is indented with numerous bays and inlets, of which the more important are Bantry Bay, Kinsale and Cork harbours. The climate is remarkably mild, though moist. The county is watered by the Bandon, Lee, and Blackwater. Cattle, sheep, pigs, and quantities of butter are exported. The fisheries are important. The county town is Cork; other towns are Queenstown, Fermoy, Youghal, Bandon, Mallow, and Kinsale. Pop. (1926) 365,722.

Cork, a city, capital of County Cork, Irish Free State, on the River Lee. It is 15 miles from the sea, and besides an upper harbour at the city itself, and quays extending over 4 miles in length, there is a lower harbour at Queenstown, 11 miles below the town. The harbour is accessible for the largest liners at all states of the tide, and is extremely well sheltered. Cork is the second city in the Irish Free State, and exports grain, butter, bacon, hams, eggs, and live-stock. The principal industries are tanning, distilling, brewing, and the making of tweeds, gingham, friezes, and chemical manures. There are also iron-foundries. There is a naval dockyard at Haulbowline, an island within Cork harbour. Pop. 78,468.

Cork, a tissue in which the cell-walls are chemically modified so as to be im-

pervious to water and gases. Bottle-cork is the outer bark of the cork-oak (*Quercus Suber*), a native of South Europe and North Africa, the best cork being exported from Spain and Portugal. (See *Bark*; *Oak*; *Phellogen*.) The tree is stripped for the first time when it is fifteen or twenty years old, and every eight or ten years afterwards. The quality of the cork improves with every stripping. To remove the outer bark, it is cut lengthwise and crosswise by knives of special make, great care being taken not to injure the inner bark. Its specific gravity and conducting power for heat are very low. Cork is an admirable material for such articles as bottle-stoppers, soles of shoes, floor-mats, and life-belts.

Corleone, a town, Sicily, 22 miles south of Palermo. Pop. (town), 16,304; (commune), 19,072.

Cormorant, a genus of web-footed sea-fowl. They have a longish and strongly hooked bill, long neck, short wings, and rather long rounded tail. They are gener-



Cormorant (*Phalacrocorax carbo*)

ally black or brown in colour, and though heavy fliers are powerful swimmers and expert divers for fish. The Chinese use cormorants for fishing, but as they are extremely voracious a ring is usually placed round the bird's neck to prevent it swallowing its prey. The common cormorant of Europe (*Phalacrocorax carbo*) is larger than a goose, but has smaller wings. Another British cormorant is the green cormorant or shag (*P. graculus*). It is

smaller than the common cormorant. Both these species are found also on the eastern coasts of America, and there are various other American as well as Australian species.

Cornaceæ, a natural order of polypetalous dicotyledons, consisting of about 100 species, two of which are found in Britain, *Cornus suecica*, a lowly alpine plant, and *C. sanguinea*, the common dogwood or prickwood.

Corn-cockle, a well-known weed (*Agrostemma Githago*), nat. ord. Caryophyllaceæ, with large purple flowers, very troublesome amongst crops of grain. Its seeds contain the poisonous principle called *saponine*.

Corn-crake, or **Landrail**, a bird belonging to the Rail family, found in Britain and other Central European countries in summer, but migrating south in autumn. The common British species is reddish-brown, is an excellent runner, but flies heavily. It frequents fields and makes its nest in the long grass. Its peculiarly monotonous, harsh cry is heard more often in the evening and at night than by day. It eats worms and insects.

Corneille, Pierre (1606–1684), French dramatist and poet. He began his dramatic career with comedy, and a series of vigorous dramas, *Mélite* (1629), *Chitandre*, *La Veuve*, *La Suivante*, and *La Place Royale*, announced the advent of a dramatist of a high order. In 1635 he produced his earliest tragedy, the *Médée*; but it was not till the appearance of his next work, the famous *Cid*, that Corneille's claim was recognized to a place amongst the great tragic poets. After the *Cid* appeared in rapid succession *Horace* (1639), *Cinna* (1639), and *Polyeucte* (1640). Many of his later pieces exhibit a marked decline. As a dramatist his merits are loftiness of sentiment and conception, admirably expressed in a bold and heroic style of versification and language.—Cf. H. M. Trollope, *Corneille and Racine*.

Corneille, Thomas (1625–1709), French dramatist, brother of the preceding. His comedies were imitations of the Spanish school, and were received with even greater applause than those of his brother. The first was *Les Engagemens du Hasard* (1647). His best tragedy is *Ariane* (1672).

Cornel, a tree of the nat. ord. Cornaceæ, with oval leaves, small yellow flowers, and hard wood, found native in Asia and

Southern Europe, and cultivated in British gardens.

Cornelian, or **Carnelian**, a gem of a light-red or flesh colour. It consists of silica along with minute quantities of the oxides of iron, aluminium, and sometimes of other metals, and is used for seals, bracelets, necklaces, and other articles.

Cornelius, Peter von (1784–1867), German painter. In 1811 he went to Rome, where he may be said to have founded a new school of German art, and revived fresco-painting in imitation of Michelangelo and Raphael. He afterwards settled in Munich to give his whole attention to the painting of the Glyptothek and the Ludwigskirche there. In 1841 he was invited to Berlin by Frederick William IV, who entrusted him with the painting of the royal mausoleum or Campo Santo.

Cornet, formerly the lowest rank of commissioned officer in a regiment of cavalry in the British army, corresponding to the rank of ensign in the infantry. In 1871 this rank was abolished, that of second-lieutenant taking its place.

Corning, a town, New York State, U.S.A., with glassworks, foundries, and a large trade. Pop. 15,820.

Cornish Language, a Celtic dialect, belonging to the Cymric division and allied to Welsh and Breton, spoken in Cornwall. It died out in the eighteenth century, though isolated words or terms are still in use among the fishers and miners, and some fragments of literature are still extant.

Corn Laws. The exportation of grain was prohibited in the reign of Edward III in 1360. This provision was relaxed by a statute of Richard II in 1394, by which exportation was permitted from all ports not excepted by royal proclamation. In 1463 a statute of Edward IV prohibited importation until the price exceeded the limit at which exportation was permitted. At the restoration of Charles II duties were imposed both on exportation and importation. The exportation of grain reached its highest point about 1750. In 1778 Britain became permanently a grain-importing country. From this time the main efforts of the agricultural interest were concentrated on obtaining the imposition of prohibitory duties on foreign grain. These prohibitory duties continued in force till 1846, when Sir Robert Peel,

influenced by the corn-law repeal agitation, and more especially by the Anti-Corn-law League, headed by Cobden and Bright, carried a measure repealing the duty on imported corn, except a nominal sum of 1s. per quarter.—Cf. J. S. Nicholson, *History of English Corn Laws*.

Corn Marigold (*Chrysanthemum segetum*), a common weed in British cornfields, of a rich orange colour.

Cornwall, a maritime county of England, forming the south-western extremity of the island, bounded east by Devonshire, and surrounded on all other sides by the sea; area, 868,167 acres. The coast-line is much broken. Mount's Bay, Falmouth Bay and Harbour, Whitesand Bay, Fowey Harbour, and St. Austell Bay are the principal openings on the south coast. On the north coast there are no harbours of consequence. Between these two coasts is the promontory of Land's End, terminating in granite cliffs about 60 feet high. Some of the other cliffs exceed 400 feet in height. The rivers are numerous but short. Much of the area, especially in the elevated districts, is barren moorland. About a fifth is under the plough. The chief wealth of the county is in its minerals, especially its mines of copper and tin, though the value of both has greatly sunk. Besides tin and copper, silver, lead, zinc, iron, manganese, antimony, cobalt, and bismuth are found in comparatively small quantities. There are also valuable deposits of kaolin or china-clay. There are no manufactures, but the fisheries, particularly of pilchard and mackerel, are valuable. The chief towns are Bodmin (county town), Penzance, Truro, and Falmouth (with Penryn). It gives the title Duke of Cornwall to the eldest son of the sovereign of Great Britain, and forms a royal duchy, the revenues of which (about £240,000) belong to the Prince of Wales for the time being. The annual sum paid to his private account is about £60,000. Pop. (1931), 317,951.

Cornwall, a port and manufacturing town of Canada, province of Ontario, on the north side of the St. Lawrence. Pop. 7419.

Cornwallis, Charles, first Marquess (1738-1805), British soldier. During the American War of Independence he was besieged in Yorktown and compelled to surrender on 19th Oct., 1781. This disaster proved decisive to the result of the

war. In 1786 Lord Cornwallis went out to India as Commander-in-Chief and Governor-General, invaded Mysore in 1791, and obliged Tippoo Sahib to surrender much territory. He suppressed the Irish rebellion of 1798, and again became Governor-General of India (1804).

Coro, a seaport-town, Venezuela, capital of the state of Falcón. Pop. (1926), 10,932.

Corolla, in botany, the portion of the flower immediately inside the calyx; the inner floral envelope. The corolla surrounds the parts of fructification, and is composed of leaves called petals. When there are several free leaves it is called a *polypetalous* corolla, as in the rose; but when the petals are united by the margins into a continuous structure it is called *monopetalous*, or more correctly *gamopetalous*. See *Flower*.

Coromandel Coast, the east coast of the Indian Peninsula, Madras Presidency, or that portion of it between Palk's Strait and the River Pennar. It is open, sandy, and has no secure harbours, and the surf renders landing difficult and often impossible except by the native catamaran.

Corona. See *Halo*.

Coronation. In England kings are anointed and crowned in Westminster Abbey. The Archbishop of Canterbury puts the coronation oath to the sovereign, who swears to govern according to the statutes of Parliament, to cause law and justice in mercy to be executed, and to maintain the Protestant religion.

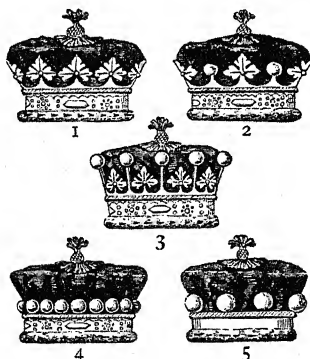
Coronation Chair, an ancient chair kept in Westminster Abbey, and used at the coronation of the sovereigns of England, all of whom have been crowned in it since Edward I. In a space beneath the seat is the *Coronation Stone*, the Scottish *Lia Fail* or 'Stone of Destiny', carried off to England by Edward I. The Scots had previously, according to the legend, carried it off from Ireland, where it was used in the coronation of Irish kings at Tara. Monkish authorities also state that the stone was originally Jacob's pillow; but it bears a suspicious resemblance to the red sandstone of some rocks near Scone, where it was used in the coronation of Scottish kings.

Coronel, a seaport of Chile (depth at entrance, 15 fathoms). Coal is mined in the vicinity and is the chief export. Pop. 5438.

Coroner, an official in England whose

chief duty is to inquire into the cause of the death of persons killed or dying suddenly. Since the Coroners (Amendment) Act, 1926, the jury need not view the body, and a jury may be dispensed with in some cases. If the jury have brought in a verdict of murder or manslaughter, the coroner must issue a warrant of arrest and detain the person charged.

Coronet, a variety of crown such as is worn by princes and noblemen. The coronet of a British duke is set round with eight strawberry leaves; that of a marquess has four strawberry leaves and four silver balls ('pearls') alternately; that



1, Coronet of a Duke. 2, Coronet of a Marquess. 3, Coronet of an Earl. 4, Coronet of a Viscount. 5, Coronet of a Baron.

of an earl has eight strawberry leaves placed alternately with as many silver balls, each ball being mounted on a pyramidal point or ray; that of a viscount is surmounted by sixteen silver balls; that of a baron has six silver balls. See *Crown*.

Coronium. The spectrum of the sun's corona contains several bright lines, notably a brilliant green one, unknown in terrestrial spectroscopy. The element producing it, designated 'coronium', is supposed to have an atom of simpler structure than any known chemical element.

Corot, Jean-Baptiste-Camille (1796-1875), French artist. He frequently painted figure subjects, including the sacred picture *The Flight into Egypt*; but his most characteristic and successful work was in landscape. His *Macbeth* is

in the Wallace Collection, and *Pastorale—Souvenir d'Italie* in the Glasgow Corporation Art Gallery. His woodland scenes are among the most important contributions of the century to landscape art.—Cf. G. Moore, *Ingres and Corot in Modern Painting*.

Corporal, in the British army, a non-commissioned officer ranking above the ordinary private and below the sergeant.—*Lance-corporal* is an appointment, not a rank. He performs some of the duties, but does not receive the pay, of a corporal.

Corporation, in law, a civil or political body in which are vested certain rights or privileges with a view to their preservation in perpetual succession. A corporation may consist of one person only and his successors, when it is called *sole* (the sovereign of Britain for example); or of a number of persons, when it is called *aggregate*. Corporations are created either by a charter from the sovereign, by Act of Parliament, or by prescription. Joint-stock companies are a species of corporation.

Corporation and Test Acts, two Acts of note in English history. The Corporation Act, passed in 1661, prevented any person from being legally elected to any office belonging to the government of any city or corporation in England unless he had, within the twelvemonth preceding, received the sacrament of the Lord's Supper according to the rites of the Church of England. The Test Act, passed in 1673, required all officers, civil and military, to take the oaths, and subscribe a declaration against transubstantiation, in the courts of King's Bench or Chancery, within six months after their admission. Both Acts were repealed in 1828.

Corpuscular Theory of Light, the older theory, which explained the phenomena of light by supposing that a luminous body emits excessively minute particles of matter, corpuscles as they were called, which striking the eye produce the sensation of light. Newton held the corpuscular theory, and supported it with great ingenuity. It has long been displaced by the *undulatory theory*; but the recent discoveries of the atomic nature of electricity, and even, in a sense, of radiation, are tending to revive interest in the old theory and its possibilities. See *Electron*; *Ether*; *Light*; *Matter*; *Quantum Theory*; *Radiation*.

Correction of the Press, the correction of printed matter before publication. The first impression taken from the types is called a *proof*, and almost always contains some errors. In correcting proofs for the printer the following signs are used:

When a wrong word or letter occurs, a line is drawn through it, and the proper word or letter written in the margin opposite.

If a clause, word, or letter is omitted, a caret (^) is marked at the place, and the omission is written in the margin.

If a superfluous letter or word occurs, the pen is drawn through it, and the character Ø (signifying delete, or take out) written in the margin.

Where words are improperly joined, a caret is written at the place where the separation should be made, and the mark # written in the margin.

When syllables or words are improperly separated, they are joined by horizontal parentheses, as *du ty*. These parentheses are to be made in the margin as well as at the break.

When words are transposed, they are to be connected by a curved line, as *(not is)*

when set up in error for 'is not', and the abbreviation *tr.* (transpose) is to be written in the margin.

When a letter is turned, a line is drawn under it, and the mark 9 made in the margin.

When punctuation is omitted, or requires to be altered, a caret is put at the place, and the comma or period, &c., is placed in the margin, with a stroke behind it, as ,/.

If a mark of quotation or superior letter has been omitted, the caret is made as before, and a mark of this sort ✓, ✓, or ✓, placed in the margin.


An inferior figure or letter is indicated thus, ₂

Words which are to be printed in italics are marked beneath with a single line, as *office* (*office*); if in small capitals, with two lines, as *Greece* (*GREECE*); if in full capitals, with three, as *James* (*JAMES*); if in black type, with a waved line, as

Rome (*Rome*). Where these marks are used in correction, the abbreviations *ital.*, *small caps.*, *caps.*, or *black* should be written in the margin.

Where a word printed in italics is to be altered to roman letters, a line is to be drawn under it, and the abbreviation *rom.* written in the margin.

Where a corrector, after altering a word, changes his mind, and prefers to let it stand, dots are placed under the word in the proof, and the word *stet* (let it stand) written in the margin.

When two paragraphs are to be joined, the end of the one and the beginning of the other paragraph are connected by a curved line , and the words *run on* written in the margin.

Where a new paragraph is to be made, the mark [is inserted at the place, and the abbreviation *par.* or *N.P.* written in the margin.

The corrections should always be written in the margin of the proof, so as to ensure notice by the printer; and when these are numerous or intricate, it is advisable to connect them by a line drawn from the place where they are to be made.

Correggio, Antonio Allegri (1494–1534), Italian painter. Correggio is unrivalled in chiaroscuro and in the grace and rounding of his figures. Among his best pictures are: *The Marriage of St. Catherine*; the fresco of *The Ascension* in the church of St. John, Parma; *The Assumption of the Virgin* in the cathedral of the same city; and the *Ecce Homo* and *Cupid, Mercury, and Venus*, both in the National Gallery, London. — BIBLIOGRAPHY: C. Ricci, *Life and Times of Correggio*; T. S. Moore, *Correggio*.

Corrèze, an inland department, France, deriving its name from the River Corrèze, by which it is traversed; area, 2272 sq. miles; capital, Tulle. Except in a few valleys the soil is far from fertile, heaths occupying a great extent of surface. Pop. (1926), 269,289.

Corrib, Lough, a large lake in the Irish Free State, mostly in County Galway, partly also in County Mayo, 23 miles in length, and from 2 to 6 miles in breadth. It receives the drainage of Lough Mask through a subterranean channel, its own waters being carried by Galway River to Galway Bay.

Corrientes, a town, Argentine Repub-

lic, capital of the province of same name, on the Paraná. It is well placed to serve as an entrepôt of goods between the upper parts of the Paraguay and the Paraná and the seaports on the La Plata. Pop. 28,681.—The surface of the province is flat and swampy, though there are wooded areas on the banks of the Paraná. Cattle-rearing is the main industry. Area, 33,535 sq. miles; pop. 371,815.

Corrosive Sublimate, or Mercuric Chloride (HgCl_2), a white crystalline solid, an acrid poison of great virulence. Its dilute solution is one of the most powerful antiseptics. It is also used for the purpose of preserving museum specimens.

Corryvreckan, a strait between the Islands of Jura and Scarba on the west coast of Scotland, and containing a dangerous whirlpool of the same name.

Corsica, an island in the Mediterranean, forming the French department of same name. It is separated from the Island of Sardinia, on the south, by the Strait of Bonifacio, about 10 miles wide; length, 110 miles; breadth, near its centre, 53 miles; area, 3367 sq. miles. The east coast is almost unbroken, but on the west coast are a number of deep bays, St. Fiorenzo, Calvi, Porto, Liscia, Ajaccio, and Valinco. The interior is traversed by a mountain chain, the culminating point of which is Monte Cinto, 8891 feet high. From the east and west sides of the chain numerous streams flow to opposite sides of the coast, generally mere torrents. There are large forests containing pines, oaks, beeches, chestnuts, and cork trees, and the mountain scenery is splendid. In the plains and numerous valleys the soil is generally fertile; but agriculture is in a backward state. There are good fisheries. In minerals Corsica is not rich. The chief exports are wine, brandy, olive-oil, chestnuts, fruit, and fish. The chief towns, Ajaccio and Bastia, are connected by railway. The most distinguished men to whom Corsica has given birth are Paoli and Napoleon. Pop. (1926), 289,890.—**BIBLIOGRAPHY:** James Boswell, *An Account of Corsica* (1768); L. H. Caird, *History of Corsica*; J. M. Chapman, *Corsica: an Island of Rest*.

Cortez, or **Cortes**, Hernando (sometimes spelt Fernando), or Hernan (1485–1547), the conqueror of Mexico. Cortez started on a voyage of discovery from

Santiago de Cuba in 1518 with 11 vessels, about 700 Spaniards, 18 horses, and 10 small field-pieces. He landed on the shore of the Gulf of Mexico. Having induced the Totonacs and Tlaxcalans to become his allies, he marched towards Mexico. After a desperate struggle, in which 100,000 Mexicans are said to have perished, the city was taken, and soon after the whole country was subjugated. In 1528 he returned to Spain; but two years after he was again sent out to Mexico, where he remained for ten years, discovering meanwhile the Peninsula of California.—**BIBLIOGRAPHY:** W. H. Prescott, *History of the Conquest of Mexico*; F. A. MacNutt, *Fernando Cortes*.

Corundum, mineral aluminium oxide (alumina), crystallizing in the trigonal system in tapering bipyramidal forms, which are often rough on the surface and assume ellipsoidal shapes. Its hardness is between that of topaz and diamond. Its colour is commonly greyish, verging on blue, or brownish red. When free from impurities and transparent, the blue variety is the valuable gem *sapphire*, and the red is the true *ruby*.

Corunna, a seaport on the north-west coast of Spain, in the province of the same name in Galicia. The harbour, which is well protected, is deep, spacious, and safe, and accommodates vessels up to 22 feet. There is a Government cigar factory employing several thousands of women and girls; glass and cotton goods are also made. There is a lighthouse, 92 feet high, called the Tower of Hercules, which was restored under Trajan. Pop. 62,893.—The province is hilly, and its inhabitants chiefly engage in agriculture and fishing. Area, 3051 sq. miles; pop. 718,613.

Corvée, in feudal law, an obligation on the inhabitants of a district to perform certain services, as the repair of roads, for the sovereign or the feudal lord. In France this system was not finally abolished until 1792.

Corvidæ, the crows, a family of passerine birds, in which the bill is strong, of conical shape, more or less compressed, and the gape straight. The nostrils are covered with stiff bristle-like feathers directed forwards. The family includes the common crow, rook, raven, magpie, jay, jackdaw, nut-cracker, and Cornish chough.

Corvinus, Matthias (1442–1490), King of Hungary, second son of John Hun-

niades. In 1458 he was called to the throne. He maintained his position against Frederick III, repelled the invading Turks, and between 1468 and 1478 conquered Silesia, Moravia, and Lusatia; he was also victorious over the Poles, and took the greater part of Austria, including Vienna, from Frederick.

Coryate, Thomas (1577–1617), English traveller. His wanderings, a great part on foot, were through Europe, Asia Minor, Persia, and India. His travels were published under such curious titles as *Coryate's Crudities* and *Coryate's Crambe or Coleworte twice sodden*.

Cos, an island in the Ægean Sea, on the coast of Asia Minor; area, 115 sq. miles; pop. (1927), 16,169. In Cos was manufactured a fine, translucent silk, much valued by the ancients. Cos is also the name of the principal town, a seaport formerly of some importance. The island yields grain, wine, silk, cotton, and citrons. Cos was seized by an Italian fleet in 1912, in the course of the Turco-Italian War, and became definitely Italian after the European War.

Coseley, an urban district of West Staffordshire, forming a suburb of Wolverhampton. It has extensive iron and other manufactures. Pop. (1931), 25,137.

Cosenza, an episcopal city of Southern Italy, capital of the province of Cosenza; pop. 30,028. It has manufactures of silk, pottery, and cutlery; the environs produce abundance of corn, fruit, oil, wine, and silk.—The province has an area of 2566 sq. miles, and a pop. of 487,997.

Cosgrave, William Thomas (1880–), Irish politician. He was Minister of Local Government, Dail Eireann, 1917–1921, member of the Provisional Government, Jan., 1922, and Minister for Local Government. He was elected President of the Executive Council of the Irish Free State in 1922 and 1928.

Coshiering, or Coshery, an old feudal custom in Ireland by which the lord of the soil had the right to lodge and feast himself at a tenant's house. The English based upon this right the practice of *coyne and livery*.

Cosmas, surnamed *Indicopleustes* ('the Indian navigator'), an Alexandrian merchant and traveller of the sixth century; afterwards a monk. He wrote several geographical and theological works, the most important of which extant is the *Topographia Christiana*.

Cosmogony, a theory of the origin or formation of the universe. Such theories may be comprehended under three classes: (1) The first represents the world as eternal in form as well as substance. (2) The matter of the world is eternal, but not its form. (3) The matter and form of the universe are ascribed to the direct agency of a spiritual cause; the world had a beginning and shall have an end. Aristotle appears to have embraced the first theory; but the theory which considers the *matter* of the universe eternal, but not its *form*, was the prevailing one among the ancients. The Phœnicians, Babylonians, and also Egyptians seem to have adhered to this theory. One form of it is the atomic theory, as taught by Leucippus, Epicurus, and Lucretius. The third theory of cosmogony makes God, or some deity, the Creator of the world out of nothing. This is taught in the book of *Genesis*. Anaxagoras was the first among the Greeks who taught that God created the universe from nothing.

Cossacks, tribes who inhabit the southern and eastern parts of Russia, and who, under the government of the Tsars, paid no taxes, but performed instead the duty of soldiers. They must be divided into two principal classes, both on account of their descent and their present condition—the Cossacks of Little Russia and those of the Don. The Cossacks are a mixed Caucasian and Tatar race, and in personal appearance bear a close resemblance to the Russians. Originally their government formed a kind of democracy, at the head of which was a chief or hetman of their own choice. Under the rule of the Tsars of Russia the democratical part of the Cossack Constitution gradually disappeared, and the title of chief hetman was vested in the heir-apparent to the throne. Each Cossack was liable to military service from the age of eighteen to thirty-eight, and had to furnish his own horse. They supplied the former Russian Empire with one of the most valuable elements in its national army, forming a first-rate irregular cavalry.—Cf. W. T. Cresson, *The Cossacks: their History and Country*.

Cossimbazar, a town of India, Murshidabad district, Bengal. Once an important manufacturing centre, it is now in ruins, owing to an alteration of climate which made it very unhealthy.

Costa, Sir Michael (1810–1884), British

musical composer and conductor. He was conductor of the Philharmonic Society, the Sacred Harmonic Society, the opera at Her Majesty's, and the Handel Festivals. His chief works are the opera *Don Carlos* and the oratorios *Eli*, produced at the Birmingham Festival in 1855, and *Naa-man*.

Costa Rica, the most southern state of the republics of Central America; bounded by Nicaragua, the Caribbean Sea, Panama, and the Pacific. Area, about 23,000 sq. miles. The country is mountainous, the principal range reaching a height of 11,740 feet, and containing volcanoes both active and extinct or dormant. Costa Rica has rich gold, silver, and copper deposits which are not at present worked to any extent. The country is extremely fertile. Coffee, rice, and maize are raised on the tableland in the interior, and bananas, cacao, sugar, cotton, and tobacco are cultivated in the low coast-regions. Coffee and bananas are the chief products. The forests are valuable, but have not, as yet, been exploited. There are over 3000 factories, many of which use hydro-electric power. The capital is San José, and the two established ports are Punta Arenas, on the Pacific side, and Porto Limon, on the Caribbean Sea. It has been an independent state since 1821, but the exact political status of the country was not assured until 1848, when an independent republic was proclaimed. The republic is governed by a Constitution promulgated in 1871. There are some 400 miles of railways and between 40 and 50 miles of motoring roads. The exports annually amount to over £4,000,000, mostly coffee and bananas. Roman Catholicism is the religion of the state, but there is entire religious liberty under the Constitution. Elementary education is compulsory and free. Pop. (1927), 471,525.—**BIBLIOGRAPHY:** J. B. Calvo, *The Republic of Costa Rica*; A. H. Keane, *Central and South America*.

Coster, Laurens (called *Janszoon*, that is, *son of John*) (c. 1370–c. 1440), according to the Dutch, the original inventor of printing with movable types. See *Printing*.

Costs, a term used in English law to denote legal expenses. They fall into two divisions: (a) costs as between party and party, comprising only necessary expenses of process—as a general rule costs follow the success of a lawsuit. and are awarded

on this basis; and (b) costs as between solicitor and client, comprising all expenses reasonably incurred in the ordinary conduct of the case.

Costume. The costume of the old Egyptians, which we know from the wall decorations of Egypt, consisted chiefly of a loin-cloth tied in front, a sort of short drawers, which was afterwards succeeded by a close-fitting garment leaving the arms free and reaching below the knees. A short skirt suspended from the waist was the garment adopted by the Babylonians. At all epochs of their history the Greeks employed for their dress an oblong piece of material, which they transformed into either a long shirt or a coat. All the subsequent changes in Greek dress were only the result of the manner and method in which this material was draped round the body, the degree of softness of the material, and its ornamentation. Generally speaking, Greek dress was distinguished by its simplicity. The chief garments of the Greeks were either *endymata*, lower garments worn next to the body, or *epiblemata*, over-garments. The principal Greek garment worn next to the body was the *chiton*, a long piece of material folded round the body, with apertures for the arms, the material being fastened about the shoulder with a button or a clasp. Over this garment was worn the *peplos*, a sort of mantle consisting of an oblong ample piece of material draped round the body, under the arms, and then over the shoulders. The Romans adopted from the Greeks the *chiton*, which they called *tunica*. The patricians wore over the *tunica* the *toga*, ample enough to cover the whole person of the wearer; it could also be pulled over the head for protection against the weather. The costume of the Gauls denoted their Oriental origin. It consisted of close-fitting pantaloons or loose trousers, called by the Romans *bracæ*, reaching as far as the ankles, where they were met by shoes of leather. Such was also the costume of the early Britons. British and Gaulish women wore a long tunic reaching to the ankles, and over it a shorter one called *guanacum*, whence is derived the word *gown*. When Rome became mistress of the world, Roman costume became fashionable, and for the first time the idea of fashion was introduced and developed. Rome in her turn was supplanted by Byzantium, and

Oriental influence became predominant. The Crusades having to a certain extent pulled down the barriers existing between the various nations, national differences in costume diminished, and fashion was developed. France and Spain led the way, and their influence made itself felt in other countries. In the fifteenth and sixteenth centuries French costume was influenced by Italy. Towards the middle of the sixteenth century it was the Spanish costume that predominated, and it was adopted and developed in France and in England. A new era was inaugurated by the reign of Louis XIV, which again witnessed the sway of France. Since that time French costumes have been adopted all over the civilized world.—BIBLIOGRAPHY: J. R. Planché, *A Cyclopædia of Costume*; G. Hill, *A History of English Dress from the Saxon Period to the Present Day*; T. Hope, *Costume of the Ancients*.

Cosway, Richard (1740–1821), English miniature painter. He was appointed principal painter to the Prince of Wales, and was both popular and prosperous, but was noted for vanity, extravagance, and eccentricity. The largest collection of his miniatures is in Windsor Castle.

Côte-d'Or, an inland and eastern department of France, having Dijon as its capital. It is watered by the Seine, the Saône, and their affluents, and derives its name from the Côte-d'Or hills (height, 1400 to 1800 feet), which traverse it from north-east to south-west. Area, 3391 sq. miles. The vineyards of the eastern slopes of the Côte-d'Or produce the celebrated wines of Upper Burgundy. Iron, coal, and marble are found. Pop. (1926), 328,881.

Cotentin, a peninsula of Northern France, forming part of the department of La Manche and of Normandy, celebrated for its cattle and butter. Cherbourg is the largest town.

Côtes-du-Nord, a maritime department in the north of France, forming part of ancient Brittany; capital, St. Brieuc. Area, 2786 sq. miles. The fisheries are of extreme importance. One of the main branches of industry is the rearing of cattle and horses. In manufacturing industries the principal branch is the spinning of flax and hemp, and the weaving of linen and sailcloth. Among the minerals are iron, lead, and granite. Pop. (1926), 552,788.

Cöthen, a town, Germany, Republic

of Anhalt. Beet-root sugar is the staple manufacture. Pop. 22,898.

Cotman, John Sell (1782–1842), English architectural draughtsman and landscape painter. Nearly 300 of his watercolours, including *Breaking the Cold* and *Greta Bridge*, are in the British Museum.

Cotopaxi, the most remarkable volcanic mountain of the Andes, in Ecuador; altitude, 19,500 feet. Several terrific eruptions of it occurred in the course of the eighteenth, nineteenth, and twentieth centuries.

Cotrone, a seaport of Southern Italy, province of Catanzaro. It carries on an export trade in fruits. Pop. 10,162.

Cotswold Hills, a range of hills, England, county Gloucester; extreme elevation near Cheltenham, 1134 feet. The *Cotswold sheep* are a breed of sheep remarkable for the length of their wool.

Cottingham, an urban district of England, Yorkshire, 4 miles north-west of Hull, the residence of many people engaged in business at Hull. The Hull waterworks are there. Pop. (1931), 6182.

Cotton, Charles (1630–1687), English writer. His works are numerous, including: *The Scarronides, or Virgil Travestie*; *Instructions how to Angle for a Trout and Grayling in a Clear Stream*; a supplement to his friend Izaak Walton's *Compleat Angler*; *Poems on Various Occasions*; and translations of Montaigne's *Essays* and Corneille's *Horace*.

Cotton, Sir Robert Bruce (1571–1631), English antiquary and collector of literary relics. He is chiefly remembered for the magnificent library of ancient charters, records, and other MSS. which he collected. The collection was presented to the nation in 1700. After being partially destroyed by fire in 1731, it was placed in the British Museum in 1753.

Cotton, the name given to the soft cellular hairs which encircle the seeds of plants of the genus *Gossypium*, nat. ord. Malvaceæ. The genus is indigenous to both the Old and the New World, and the plants are now cultivated all over the world within the limits of 30° north and south of the equator. The North American cotton is produced by *Gossypium barbadense* and *G. hirsutum*, and two well-marked varieties are cultivated, the long-staple cotton, which has a fine soft silky fibre about 2 inches long, and the short-staple cotton, which has a fibre little over

1 inch long adhering closely to the seed. The long-staple variety known as Sea



A Sprig of Cotton showing Flowers and Bolls

Island cotton holds the first place in the market. It is grown in some of the southern states of America, especially on islands bordering the coast. The cotton grown in South America, and most Egyptian cotton, is obtained from *G. brasiliense*, called also kidney cotton. The indigenous Indian species is *G. herbaceum*, which yields a short-stapled cotton. The cotton-wool is collected by picking with the fingers the flakes from the pods, and then spreading out to dry, an operation which requires to be carefully performed. The cotton now comes to be separated from the seeds, a process called 'ginning', which is now performed by a ginning-machine. After being cleansed from the seeds, the cotton-wool is formed into bales. Cotton has been cultivated in India and the adjacent islands from time immemorial. It was known in Egypt in the sixth century before the Christian era, but was not introduced into Europe till the ninth century, when the Moors planted the cotton-shrub at Valencia and established

factories at Granada and Cordoba. About the fourteenth century cotton thread began to be imported into England. In China the cotton-shrub was known at a very early period, though cotton was not manufactured till the fourteenth century. The shrub was planted by the English colonists of Virginia in 1621, and about 1780-1790 the British West Indies supplied Britain with most of its raw cotton. The United States then began to export cotton in large quantities, and soon out-distanced all other countries, as it still does. Of recent years there has been a serious shortage of raw cotton, due to decreased production in the United States and in Egypt and to the opening of new factories all over the world. In order to cope with this and to provide sufficient material for home factories, Great Britain is developing new Empire fields, particularly in Africa. Indian cotton being of short staple is useless for British manufacturers, and all the exports go to China and Japan. The following table gives world production

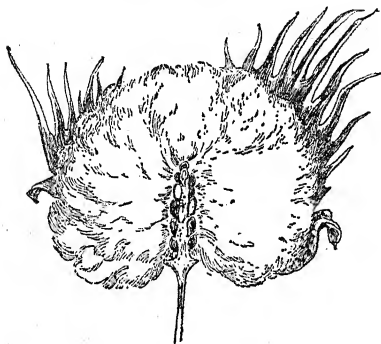
in bales of 500 lb.:

Country.	Bales.
United States (1929)	14,000,000
Brazil (1928)	481,000
Egypt (1929)	1,500,000
India (1928)	4,716,800
Uganda (1927)	102,000
Sudan (1928)	101,200
Tanganyika (1927)	13,000
Kenya (1928) ¹	1,000
Nyasaland (1928)	3,900
S. Africa (1928)	8,000
Australia (1928) ¹	4,700
British West Indies (1927) ..	4,000
Malta and Cyprus (1927) ..	6,000

¹ Still in experimental stage but capable of vast expansion:

The value of our imports of raw cotton was £77,306,000 in 1929.

In the British cotton factories are employed about 577,000 hands, and the value of the goods exported in 1923 was £179,330,000. Almost every country in the world purchases British cotton goods,



Section of open Cotton Boll

but British India is the largest market of all. See *Cotton Manufacture*. — BIBLIOGRAPHY: W. E. Hubbard, *Cotton and the Cotton Market*; *The Cotton Year Book*; Federation of British Industries, *Textile Fibres and Yarns* (The Resources of the Empire Series).

Cotton-grass, the popular name of plants of the genus *Eriophorum*, order Cyperaceæ or sedges. Several species occur in Britain in moory or boggy places, and the white cottony substance they produce is used for stuffing pillows.

Cotton Manufacture. The general and accepted subdivision of cotton manufacture involves cotton-spinning, cotton-weaving, and cotton-finishing, the last of which may or may not include bleaching, dyeing, and printing.

Cotton-spinning.—The cotton-seeds are separated from the fibre by the ginning-machine, after which the fibre is pressed into bales and dispatched from the growing areas to this and other countries. The first operation is performed by a machine called the *bale-breaker*, which not only opens the bundles but combs out the matted lumps and fans away some of the dirt. The next process is to mix the various qualities of cotton fibres to make suitable yarn. After that, the lumpy masses of fibre while being cleared of extraneous matter are laid out in smooth, even layers, and this is done perhaps by the

willow, or more probably by the *opener*. The fibres are then still further cleaned by the *scutcher*, which also forms them into sheets of an even thickness, length, breadth, and weight ready for the *carding-room* or *card*. This machine is provided with a number of appliances for drawing out the material, cleaning and straightening the fibres, making them of equal length and running side by side till the *sliver* or soft rope—the beginning of all yarns—is formed. If to be used for high-class yarn, the sliver will be treated by a *comber*, but usually the slivers from the card are taken direct to the *drawing-frame*. Here by a variety of processes they are drawn out till comparatively thin, when, to produce a uniform sliver, *doubling* and *drafting* take place. The cotton is then taken to the *slubbing-frame*, where it is still further drawn out, the sliver converted into a soft thread, circular in section, by the introduction of a slight twist. This operation is repeated in similar flyer-machines termed *intermediate slubbing-frame*, *roving-frame*, and *jack-frame*, the latter used only for fine yarns. The slightly twisted material, termed *rove yarn* or *roving*, is taken to the spinning-frame, where a further draft takes place, and a considerable amount of twist is imparted to the drawn-out rove to form the finished yarn. At least three distinct methods of spinning may be practised: (1) *throstle-flyer spinning*, (2) *ring-spinning*, (3) *mule-spinning*. The two latter are most extensively used, and the mule only for the very finest yarns. Up to the middle of the eighteenth century the spinning-wheel and distaff were used for spinning. Then attempts were made to dispense with the hand-wheel, and to substitute more elaborate apparatus. In the transition from hand- to machine-spinning, Paul, Wyatt, Hargreaves, Arkwright, and Crompton played important parts. James Hargreaves, a weaver of Stand-hill, near Blackburn, invented the spinning-jenny about 1767, and placed the spindles vertically instead of horizontally; Richard Arkwright, a barber of Preston and Bolton, invented the water-frame in 1769, a method of spinning with the aid of rollers; while between 1774 and 1779 Samuel Crompton of Bolton invented the mule-jenny, the forerunner of the modern self-acting mule. The principles embodied in these three patents

form the chief features in all modern preparing- and spinning-machinery.

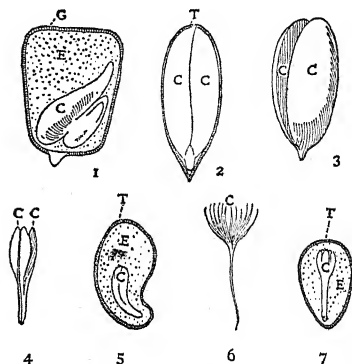
Cotton-weaving.—Yarns which are intended to be woven into ordinary cloth are divided into two distinct groups, *warp* and *weft*, although in the cotton trade these are usually designated respectively *twist* and *weft*. In the process of weaving, all the warp threads are operated collectively and simultaneously, whereas the weft picks are introduced singly. Yarns are sometimes bleached, dyed, or in some other way specially treated before weaving, but as a rule they are woven in the natural colour and may pass direct to the two distinct departments—warp-winding and weft-winding. The weft may, however, come direct from the mule-spindles in the form of cops ready to be placed on the tongue or peg in the well of the shuttle. At other times, the weft is rewound on to pirn bobbins ready for the shuttle, and these constitute practically all that has to be done to prepare the weft for the operation of weaving. On the other hand, there is a considerable amount of labour required before the warp threads are ready for being operated in the loom to receive the weft. After this necessary preparation the warp and weft are interwoven with each other according to pattern or designation of cloth, and it will be understood that there is a huge variety, among which might be mentioned calicoes, sheetings, longcloths, twills, sa-teens, flannelettes, plain and striped drills, shirtings, zephyrs, voiles, towels, poplins, fustians (velveteens, corduroys, moleskins, and the like), brocades, and costume cloths. In practically all cases the threads of the warp are separated mechanically into two layers, between which the shuttle is driven, and the latter leaves a trail of weft each journey from left to right and from right to left, the reversal of direction causing the weft to bend partially round the outermost thread at each side, in order to form the selvages of the cloth.

Cotton-finishing.—Before each type of cloth is subjected to its own method of finishing it is carefully examined and all foreign matter removed. 'Finishing' includes all such operations as washing, boiling, bleaching, drying, squeezing, calendaring, folding, and pressing. Piece goods may be stamped or marked, measured, rolled, lapped, or plaited, while wide cloths may be doubled lengthwise (termed

rigging) and simultaneously rolled. Goods which are to be transformed into definite lengths or shapes for various garments, towels, and other articles may be cut up by means of a band-saw or by electric cutters.

Cotton-seed Oil, a useful oil expressed from the seeds of the cotton plant, and manufactured largely in the United Kingdom and in America. Cotton-seed oil-cake is a valuable cattle food.

Cotyledons, the seed-leaves or seed-lobes of the embryo plant, forming, together with the radicle and plumule, the embryo, which exists in every seed capable



1, Maize (Monocotyledonous seed). 2, Apple (Dicotyledonous exalbuminous seed). 3, Embryo of Apple seed. 4, Embryo of Poppy seed. 5, Poppy (Dicotyledonous seed). 6, Embryo of Pine seed. 7, Pine (Polycotyledonous albuminous seed). C, Cotyledon. E, Endosperm. T, Seed-coat (testa). G, Grain-coat (testa + pericarp).

of germination. Some plants have only one cotyledon, and are accordingly termed *monocotyledonous*; others have two, and are *dicotyledonous*; those with more than two are *polycotyledonous*. These differences are accompanied by remarkable differences in the structure of the stems, leaves, and blossoms which form the basis for the division of flowering plants into two great classes. See *Monocotyledons*; *Dicotyledons*.

Couch Grass, a perennial grass which is propagated both by seed and by its creeping root-stock, and is one of the most common and troublesome weeds of agriculture.

Cougar, or **Puma**, a quadruped of the cat kind, inhabiting most parts of America—*Felis concolor*. Its colour is a uniform fawn or reddish-brown, without spots or markings of any kind.

Coulomb, Charles Augustin de (1736–1806), French physicist. His fame rests chiefly on his discoveries in electricity and magnetism, and on his invention of the torsion balance.

Council, **Œcumenical**, an assembly of the representatives of independent Churches, convened for deliberation and the enactment of canons or ecclesiastical laws. The four general or œcumenical councils recognized by all Churches are: (1) the Council of Nice, in 325, by which the dogma respecting the Son of God was settled; (2) that of Constantinople, 381, by which the doctrine concerning the Holy Ghost was decided; (3) that of Ephesus, 431; and (4) that of Chalcedon, 451; in which two last the doctrine of the union of the divine and human nature in Christ was more precisely determined. Among the principal Latin councils are that of Clermont (1096), in which the first Crusade was resolved upon; the Council of Constance, held in 1414, which pronounced the condemnation of John Huss (1415) and of Jerome of Prague (1416); the Council of Basle, in 1431; and the Council of Trent, which began its session in 1545, and laboured chiefly to confirm the doctrines of the Catholic Church against the Protestants. On 8th Dec., 1869, an œcumenical council, summoned by a Bull of Pope Pius IX, assembled at Rome. It lasted till 18th July, 1870, when it was adjourned. This council proclaimed the infallibility of the Pope when speaking *ex cathedra*.—**BIBLIOGRAPHY**: W. P. du Bose, *The Œcumenical Councils*; T. H. Bindley, *The Œcumenical Documents of the Faith*.

Council Bluffs, a city and important manufacturing centre in Iowa, U.S.A., on the left bank of the Missouri, opposite Omaha city, with which it is connected by a bridge. Pop. 36,162.

Counsel, or **Counsellor**, a member of the Bar retained by a client through his solicitor to plead his cause in a Court of Judicature. The term is applied to a number of legal counsellors engaged together in a case. *King's Counsel* are appointed counsel to the Crown and are nominated by the Lord Chancellor. Their gowns are of silk.

Count appears to have been first used, as a title of dignity, in the reign of the Roman Emperor Constantine. After the fall of the Roman power the title was retained. About the end of the fifteenth century in Germany, and under the last princes of the Merovingian race in France, the title appears to have become hereditary in certain families.

Counterpoint, in music, a term (originated in the fourteenth century) equivalent to harmony, or the writing of a carefully planned accompanying part; or that branch of the art which, a musical thought being given, teaches the development of it, by extension or embellishment, by transposition, repetition, or imitation, throughout the different parts. The study of counterpoint received a new and wonderful development in the works of Handel and Bach.

Count-out, in the British House of Commons, the act of the Speaker when he counts the number of members present, and, not finding forty, intimates that there is not a quorum, when the sitting stands adjourned. The proceedings may be continued, however few be present, provided no member formally moves a count.

County, originally a district subject to a *count* or earl. It is now a civil division corresponding to *shire* in England and Scotland. Each British county has its Lord-Lieutenant, its sheriff, and its court or courts, with various officers employed in the administration of justice and the execution of the laws. The City of London is also a county by itself. The provinces of Canada are also divided into counties, as are the Australian colonies and each of the United States.

County Courts, an ancient English institution. The new County Courts were established in 1846 with the object of recovering small debts cheaply and quickly. Their jurisdiction is now governed by the County Courts Act, 1888, as amended by subsequent Acts of 1903, 1919, and 1924, the Judicature Consolidation Act, 1925, and various other statutes, e.g. the Rent Restriction Acts, the Guardianship of Infants Act, 1925.

Couplet, a pair of lines of verse closely welded together, usually by rhyme. The elegiac couplet, consisting of hexameter and pentameter, is perhaps the most celebrated metre of the ancient world. The

heroic couplet was used with much skill by Chaucer, and was very largely employed by Pope and Dryden. Detached couplets are usually aphorisms.

Courbevoie, a town of France, department of Seine, on the left bank of the Seine, 5 miles N.W. of Paris, of which it forms a suburb. Pop. 38,900.

Courland, a former Baltic province bounded by Livonia, the Gulf of Riga, the Baltic, Kovno, and Vitebsk; area, 10,435 sq. miles; pop. 812,300. It is now part of Latvia, though Lithuania claims a certain area. The capital is Mittau, and the largest city is Libau. The province is very flat, and on the coast there are extensive sandy heaths. Forests cover two-fifths of the area. The peasantry are Letts, and the other classes Teutons. The religion is Lutheran. Courland was successively Polish (1561–1701), Swedish (1701–1795), and Russian (1795–1917). In 1917 it became independent, but two years later was included in Latvia.

Coursing, a sport in which hares are hunted by greyhounds, which follow the game by sight instead of by scent. When a hare is started, it is allowed a certain advance on the dogs, which are then let loose from the 'slips' or cords held by the 'slipper' and fastened to the dogs' collars. A judge keeps his eyes on the dogs, and notes what are called 'points', the victory being adjudged to the dog which makes the most 'points'. The invention of the electric hare led to an enormous increase in racing in 1927, and tracks were opened all over Britain.

Court. See *Admiralty Court*; *Appeal*; *Arches*, *Court of*; *Chancery*; *Common Pleas*; *Divorce*; *Equity*; *Exchequer*; *Justiciary*; and *Session, Court of*.

Courtesy, Tenure by, in law, is where a man marries a woman solely seized of an estate of inheritance and has by her issue born alive capable of inheriting her estate. In this case, on the death of his wife he holds the lands for his life as tenant by courtesy. Tenancy by courtesy still exists in only a few cases.

Courtesy Title. When a British nobleman has several titles, it is usual to give one of his inferior titles to his eldest son. Thus the eldest son of the Duke of Bedford is *Marquess* of Tavistock, and the Duke of Buccleuch's eldest son is *Earl* of Dalkeith. The younger sons of a duke or marquess have the courtesy title of *Lord*, followed

by their Christian and surname, as *Lord William Lennox*. The daughters of dukes, marquesses, and earls have the courtesy title of *Lady*, as *Lady Mary Hamilton*. The younger sons of earls, and all the children of viscounts and barons, are known as the Honourable A— B— (Christian and surname). In Scotland, the eldest son of a viscount or baron whose title dates farther back than 1707 has often the courtesy title of *Master*, as the *Master* of Lovat, eldest son of Lord Lovat.

Court-martial, the name given to the tribunal which is authorized by law to investigate and, if necessary, punish certain offences committed by persons subject to military law. The present-day courts-martial are of two degrees—the general and the district court-martial. These differ (a) as to the legal minimum of members; (b) in the punishment awardable; (c) as to the ranks of the persons they are competent to try. A general court-martial at home and in India must consist of at least nine members, while a district court-martial need not have more than three. A general court-martial can award any punishment authorized by the Army Act; a district court-martial cannot award more than two years' imprisonment. A general court-martial can try any officer or soldier subject to military law; a district court-martial cannot try an officer, and can only sentence a warrant-officer to certain specified punishments. — BIBLIOGRAPHY: Simmons, *On the Constitution and Practice of Courts-martial*; E. S. Dudley, *Military Law and the Procedure of Courts-martial*.

Courtrai, a fortified town, Belgium, province of West Flanders, on the Lys. Its manufactures are table-linens, lace (which is celebrated), cambrics, and cotton goods, and it has extensive bleaching- and dyeing-works. Pop. 37,102.

Cousin, Victor (1792–1867), French philosopher and writer, founder of the so-called Eclectic school of philosophy. In 1815 he became deputy-professor of philosophy at the Sorbonne. In 1817 he visited Germany, and became acquainted with the writings of Kant, Fichte, Jacobi, and Schelling, by whose opinions his own were henceforth modified. He lost his position as public teacher on political grounds in 1822, and did not resume teaching till 1828. After the July Revolu-

tion (1830) he entered the Council of Public Instruction. In the Cabinet of Thiers in 1840 he accepted the office of Minister of Public Instruction. The Revolution of 1848 brought his public career to a close. The following are among his works: *Fragments Philosophiques; Nouveaux Fragments Philosophiques; Cours de Philosophie Morale; Cours de l'Histoire de la Philosophie; Histoire de la Philosophie au dix-huitième Siècle; De la Métaphysique d'Aristote* (1838); *Philosophie Scolastique* (1840); *Du Vrai, du Beau et du Bien* (1854); &c.

Cousins, Samuel (1801-1887), English engraver. He engraved plates after Lawrence, Landseer, Reynolds, Millais, Leslie, Eastlake, and Ward.

Coutts, Thomas (1735-1822), English banker. Son of an Edinburgh provost, he early went to London, engaged with his brother in banking, and amassed an immense fortune.

Couvade, a singular custom prevalent in ancient as well as modern times among some of the primitive races in all parts of the world. After the birth of a child the father takes to bed, and receives the food and compliments usually given elsewhere to the mother. The custom was observed, according to Diodorus, among the Corsicans; and Strabo notices it among the Spanish Basques, by whom, as well as by the Gascons, it is still to some extent practised. Travellers from Marco Polo downwards have met with a somewhat similar custom among the Chinese, the Dyaks of Borneo, and the negroes. The custom of the couvade has been observed in its most typical form in South America and the West Indies.

Covenant, in Scottish history, the name given to a bond or oath drawn up by the Scottish reformers, and signed in 1557, and to the similar document or Confession of Faith drawn up in 1581, in which all the errors of Popery were explicitly abjured. The latter was subscribed by James VI and his council, and all his subjects were required to attach their subscription to it. It was again subscribed in 1590 and 1596. The subscription was renewed in 1638. The *Solemn League and Covenant* was a solemn contract entered into between the General Assembly of the Church of Scotland and commissioners from the English Parliament in 1643, having for its object a uniformity of doctrine, wor-

ship, and discipline throughout Scotland, England, and Ireland. In 1662 it was abjured by Act of Parliament, both in England and Scotland. The *Ulster Covenant* was a solemn declaration signed by 218,206 loyalists of Ulster on 28th Sept., 1912 ('Ulster Day'), wherein they pledged themselves to stand by each other in defence of their rights, to use all means which might be found necessary to defeat the Home Rule Bill, and to refuse to recognize the authority of a Dublin Parliament.

Covenanters, in Scottish history, the name given to the party which struggled for religious liberty from 1637 on to the revolution; but more especially applied to the insurgents who, after the passing of the Act of 1662 denouncing the Solemn League and Covenant as a seditious oath (see *Covenant*), took up arms in defence of the Presbyterian form of Church government. The first outbreaks took place in the hill country on the borders of Ayr and Lanark shires. The murder of Archbishop Sharp on Magus Moor, and the defeat at Drumclog, alarmed the Government, who sent a large body of troops under the command of the Duke of Monmouth to put down the insurgents, who had increased in number rapidly. The two armies met at Bothwell Brig, where the Covenanters were totally defeated (22nd June, 1679). In consequence of the rebellious protest called the *Sanguhar Declaration*, put forth in 1680 by Cameron, Cargill, and others, as representing the more irreconcilable of the Covenanters (known as Cameronians), and a subsequent proclamation in 1684, the Government proceeded to more severe measures. During this 'killing time', as it was called, the sufferings of the Covenanters were extreme; but their fanatic spirit seemed only to grow stronger.—**BIBLIOGRAPHY:** J. K. Hewison, *The Covenanters*; Alexander Smellie, *Men of the Covenant*; J. P. Thomson, *The Scottish Covenanters, 1637-1688*.

Covent Garden, a market-place in London, which formerly consisted of the garden belonging to the abbot and monks of Westminster. In 1831 the present market buildings were erected by the Duke of Bedford.

Coventry, a city in Warwick, England. It was formerly surrounded by lofty walls and had twelve gates. Pageants and

processions were celebrated in old times with great magnificence, and a remnant of these still exists in the processional show in honour of Lady Godiva. Coventry is the centre of the ribbon trade and of the manufacture of bicycles and motor-bicycles. It has also aeroplane works and manufactures of cambric, cotton, and watches. Pop. (1931), 167,046.

Coverdale, Miles (1488–1568), the earliest translator of the Bible into English. In 1535 his translation of the Scriptures appeared, with a dedication to Henry VIII. In 1551, during the reign of Edward VI, he was appointed Bishop of Exeter, but was ejected on the accession of Mary. On the accession of Elizabeth he returned from Geneva to England. Coverdale's works and letters were published by the Parker Society in 1846.

Covilha, a town, Portugal, province of Beira. In the neighbourhood there are noted sulphurous baths. Pop. 14,049.

Covington, a city of Kentucky, U.S.A., on the south bank of the Ohio River, opposite Cincinnati, of which it is substantially a suburb, connected by means of bridges and ferries. It has a large general trade and manufacturing business. Pop. 57,121.

Cowbane, or Water-hemlock (*Cicuta virōsa*), a perennial, umbelliferous, highly poisonous aquatic plant.

Cow-berry, the *Vaccinium Vitis idæa*, red whortleberry, a procumbent shrub of high moorlands in Europe, Asia, and North America, has evergreen box-like leaves, and produces a red acid berry closely resembling cranberries, and used for jellies and preserves.

Cow-bird, a name applied to the species of the genus *Molothrus*, which has a wide range through America, and is included in the passerine family Icteridæ. The North American species, *M. pecoris*, is about the size of a skylark. It drops its eggs into the nests of other birds to be hatched by them.

Cowdenbeath, a burgh of Scotland, Fifeshire, in a mining district. Pop. 12,731.

Cowdray, Weetman Dickinson Pearson, first Viscount (1856–1927), British capitalist, contractor, and politician. Entering business, he became head of the contracting firm of S. Pearson & Son, Ltd., and superintended the construction of the Dover Harbour Works and the Blackwall Tunnel. In 1917 he was created a viscount

and appointed Chairman of the Air Board.

Cowen, Sir Frederic Hymen (1852–), British musical composer and conductor. Among his works are: *The Maid of Orleans* (1871); *Sleeping Beauty*, cantata (1885); *Ruth*, oratorio (1887); Harold, opera (1895); and *The Veil* (1910). In 1913 he published his memoirs under the title *My Art and My Friends*.

Cowes, West, a seaport, England, Isle of Wight, at the mouth of the River Medina. It is well known as a yachting port, with a safe roadstead and ample repair facilities. Pop. (1931), 10,179.—*East Cowes*, on the opposite side of the river, is connected with it by a steam-ferry and floating bridge. Pop. (1931), 4595.

Cowley, Abraham (1618–1667), English poet. He published his first volume, *Poetical Blossoms*, at the age of fifteen. His poems have failed to maintain their former popularity, but he still holds a certain position as a prose writer and essayist. His chief works are: *Love's Riddle*, a pastoral comedy; *Davidis*, a scriptural epic; *Nauffragium Joculare*; *The Mistress*, a collection of love verses; *Pindarique Odes*; and *Liber Plantarum*.

Cow-parsnip, an umbelliferous plant, genus *Heracleum*, one species of which, *H. Sphondylium*, found in England, grows to the height of 4 or 5 feet, and is used to feed pigs.

Cowpen, a former urban district of England, in Northumberland, closely connected with the town of Blyth.

Cowper, William (1731–1800), English poet. Dread of a public examination caused him to become insane, and from Dec., 1763, to June, 1765, he remained under the care of Dr. Cotton at St. Albans. At Huntingdon he made the acquaintance of the Rev. Mr. and Mrs. Unwin. On the death of Mr. Unwin, in 1767, he removed with Mrs. Unwin to Olney. In 1776, by Mrs. Unwin's advice, he commenced a poem on the *Progress of Error*, which he followed by three other poems, *Truth*, *Table-talk*, and *Expostulation*. Another of his friends, Lady Austen, suggested *The Task*. *The History of John Gilpin* is also due to the suggestion of Lady Austen. The translation of Homer, begun in 1784, occupied him for the next six years, and was published in 1791. He removed during its progress, in 1786, from Olney to Weston. In the beginning of 1794 he was again attacked with madness, which was aggra-

vated by the death of Mrs. Unwin in 1796. He is considered among the best of our descriptive poets, and is one of the most attractive of letter-writers. He and Burns brought back nature to English poetry.—
BIBLIOGRAPHY: Robert Southey, *Life and Letters*; Goldwin Smith, *William Cowper*.

Cow-pox, the vaccine disease which appears on the teats of the cow, in the form of vesicles of a blue colour, approaching to livid. These vesicles are elevated at the margin and depressed at the centre; they are surrounded with inflammation and contain a limpid fluid. This fluid or virus is capable of communicating genuine cow-pox to the human subject, and of protecting against smallpox either completely, or, at least, against the virulent form of the disease. See *Vaccination*.

Cowra, a town, New South Wales, Australia. It is an important mining and farming centre. Pop. 4041.

Cowrie-shell, a small gasteropodous shell, the *Cypræa moneta*, used for coin in some parts of Africa and in many parts of Southern Asia, and for ornament in other parts of the world.

Cowslip, the name of several varieties of *Primula veris*, order Primulaceæ, a wild flower found in Britain, with umbels of small, buff-yellow, scented flowers on short pedicels. It flowers in spring.

Cow-trees, a name of various trees having an abundance of milky juice, especially of *Brosimum Galactodendron*, a South American tree, order Moraceæ (bread-fruits), which yields a rich milky nutritious juice in such abundance as to render it an important article of food.

Cow-wheat, the name of plants of the genus *Melampyrum*, order Scrophulariaceæ, annuals, with opposite narrow leaves, yellow or pinkish flowers, and a two-celled capsule containing a few seeds. They grow in woods, cornfields, and pastures, and are parasitic on the roots of other plants. Four species are found in Britain. They are excellent food for cattle.

Cox, David (1783-1859), English landscape painter. His works are chiefly English landscapes, and his pictures are now very highly valued. Among some that have brought high prices are: *The Vale of Clwyd*, *Peace and War*, *Going to the Hayfield*, *Going to Market*, *The Skylark*, *The Church at Bettws-y-Coed*, and *The Sea-shore at Rhyl*. Cox ranks with Constable and a few others as among the greatest English

landscape painters of the earlier period. The best of his work is in the Birmingham Art Gallery, but the British Museum also possesses some of his water-colours.

Coypou, or Coypu, the native name of a South American rodent mammal resembling a beaver, and valued for its fur (called *nutria fur*).



Coypou (*Myopotamus Coypu*)

Cozens, John Robert (1752-1799), English landscape painter in water-colours. He is described as "one of the most original and imaginative of landscape-painters, and the greatest of all the precursors of Turner and Girtin in the English school of water-colour".

Cozumel, an island in the Caribbean Sea, off the coast of Yucatan.

Crab, a popular name for all the ten-footed, short-tailed crustaceans constituting the sub-order Brachyura, order Decapoda, comprising many genera, distinguished from the lobster and other macrurous or long-tailed decapods by the shortness of their tail, which is folded under the body. The head and breast are united, forming the cephalothorax, and the whole is covered with a strong carapace. The mouth has several pairs of strong jaws. They 'moult' or throw off their calcareous covering periodically. The first pair of limbs is not used for locomotion, but is furnished with strong claws or pincers. Like most individuals of the class, they easily lose their claws, which are as readily renewed. They generally live on decaying animal matter, though others live on vegetable substances, as the racer-crabs of the West Indies, which suck the juice of the sugar-cane. Most inhabit the sea. The large edible crab (*Cancer pagurus*) is common on the British shores, and is much sought after. See *Crustacea* (Plate).

Crabbe, George (1754-1832), English poet. He obtained the friendship and

assistance of Burke, published his poem *The Library*, and soon after entered the Church. In 1783 appeared *The Village*, which was followed two years afterwards by *The Newspaper*. *The Parish Register* appeared in 1807. *The Borough* appeared in 1810, and was followed in 1812 by *Tales in Verse*, and in 1819 by *Tales of the Hall*. His poems are all characterized by homely truthfulness, simplicity, and pathos.—BIBLIOGRAPHY: Canon Ainger, *Crabbe*; René Huchon, *George Crabbe and his Times*.

Cracow, a fortified town in Poland, the old capital of the country. It is situated on the left bank of the Vistula where it becomes navigable. There is a cathedral, and a university founded in 1864. Cracow exports salt, cattle, and grain, and has manufactures of machinery, agricultural implements, and chemicals. Pop. 181,700.—The county of Cracow has an area of 6711 sq. miles and a pop. of 1,990,399.

Craddock, a town of Cape Province, South Africa, an agricultural and railway centre. It trades in wool, mohair, and feathers. The climate is exceedingly healthy, and 3 miles north are warm sulphur springs, used in the cure of gout and rheumatism. Pop. 6453.

Crag, in geology, a local name in England for shelly deposits in Norfolk and Suffolk, usually of gravel and sand, of the Pliocene period, subdivided into three members, viz. the Upper or *Mammaliferous Crag*, the *Red Crag*, and the Lower or *Coralline Crag*.

Craig, John (1512-1600), Scottish reformer. He became Knox's colleague in Edinburgh, assisted in drawing up the *Second Book of Discipline*, and compiled the National Covenant signed by the king in 1580.

Craig, Sir Thomas (1538-1608), Scottish writer on jurisprudence. He is now chiefly remembered by his *Treatise on Feudal Law*.

Craigavon, James Craig, 1st Viscount (1871-), Irish statesman. He served in the South African War, and was A.A. and Q.M.G. to the 36th (Ulster) Division, 1915-1916. He entered Parliament in 1906, and was Treasurer of H.M. Household, 1917-1918, Parliamentary Secretary to the Ministry of Pensions, 1919-1920, and Parliamentary and Financial Secretary to the Admiralty, 1920-1921. On 7th June, 1921, he became the first Prime Minister of Northern Ireland.

Craigie, Pearl Mary Teresa (1867-1906), Anglo-American novelist and miscellaneous writer under the pen-name of *John Oliver Hobbes*. Her works include: *Some Emotions and a Moral* (1891); *The Sinner's Comedy*; *The Gods, Some Mortals, and Lord Wickenham*; and *Tales about Temperaments*.

Craik, Dinah Maria (1826-1887), English novelist. The best known of her numerous novels are: *John Halifax, Gentleman*; *A Life for a Life*; *Agatha's Husband*; and *The Woman's Kingdom*.

Craik, George Lillie (1798-1866), English man of letters. His first independent work of any importance was his *Pursuit of Knowledge under Difficulties*. Other works were: *Spenser and his Poetry*, *History of English Literature and the English Language*, *English of Shakspeare*, and *Bacon: his Writings and Philosophy*.

Crail, a royal burgh and seaport of Scotland, in Fifeshire. It is a very ancient burgh, and is a favourite watering-place. The harbour is about 10 feet deep. Pop. (1931), 1058.

Craiova, a town of Romania, in Wallachia, 120 miles due west of Bucharest. It is an important railway and road centre, and has a large trade in grain and cattle. The chief manufactures are leather goods and rope. Pop. 51,877.

Cramlington, an urban district of England, Northumberland, near Blyth, with numerous collieries. Pop. (1931), 8238.

Cramp, a variety of spasm, or sudden, involuntary, and painful contraction of a muscle or muscles. It is usually caused by a sudden change of temperature, as in bathing, exposure to cold, over-exertion of the muscles, or by bringing into action muscles unaccustomed to exercise.

Cranach, or Kranach, Lucas (1472-1553), German painter. On the commencement of the Reformation movement he became the intimate friend of Luther and Melancthon, whose portraits, as taken by him, are among the most interesting memorials of the age.

Cranberry, the fruit of *Oxycoccus palustris*, nat. ord. Vacciniaceæ (whortleberries), a native of Europe, North Asia, and North America. The European berry, when ripe, is globose and dark-red, and a little more than $\frac{1}{2}$ inch in diameter, and the American one is larger.

Cranbrook, a town, England, county Kent. Here the Flemings established the

first woollen manufactory in England. Pop. (parish) (1931), 12,925.

Crane, Walter (1845-1915), English artist. Among his chief pictures are: *Renascence of Venus*, *Fate of Persephone*, *Europa*, *The Bridge of Life*, *La Belle Dame Sans Merci*, *England's Emblem*, *The Rainbow and the Wave*, *Britannia's Vision*, and *The World's Conquerors*. *The Sirens Three* is a poem written and decoratively illustrated by himself. He aided the Socialist movement, both as a writer and as a lecturer. Among his writings are: *An Artist's Reminiscences* (1907), and *William Morris and Whistler* (1911).—Cf. P. G. Konody, *The Art of Walter Crane*.

Crane, the common name of members of the Gruidæ, a widely distributed family of wading birds. Cranes annually migrate to distant regions, and perform voyages

North and West Africa. The demoiselle crane (*Anthropoides virgo*) is so called from the elegance of its form. It is ash-grey, and the head is adorned with two tufts of feathers formed by a prolongation of the ear-coverts. Its habitat is Africa and the south of Europe.

Crane, a machine for raising weights and depositing them at some distance from their original place. A jib crane consists of a jib or transverse beam, inclined to the vertical at an angle of from 40° to 50°. The upper end of the jib, which is stayed to the top of the shaft, carries a fixed pulley, and the lower end a cylinder. On turning the cylinder the weight is raised as far as necessary. The jib is then turned on its arbor till the weight is brought immediately over the spot where it is to be deposited.

In a *derrick* crane the stay is replaced by a chain which is used to raise or lower the jib so as to alter its reach.

The *travelling* jib crane contains the same elements as the fixed crane, but has its foundation mounted on a wheeled truck.

The *hammerheaded* crane, which is extensively used in shipbuilding yards, consists of a steel-braced tower, on the top of which the horizontal jib revolves. The jib is in the form of a double cantilever, the longer arm of which carries the lifting crab, which can be moved along the jib without altering the level of the load.

In *overhead travelling* cranes the chief parts are a pair of horizontal girders, called the bridge, which carry rails on which the crab runs; two end carriages on which the bridge rests; and running wheels for the end carriages, which allow the bridge to be moved.

Crane-fly, a genus of two-winged (dipterous) insects (Tipulæ), remarkable for the length of their legs. *Tipula oleracea* is the well-known Daddy-long-legs, whose larva is very destructive to the roots of grain crops.

Crane's-bill, the popular name given to the species of *Geranium*, from the long slender beak of their fruit. Eleven species are found in Britain. See *Geranium*.

Cranganore, a town in India, Presidency of Madras, state of Cochin, on the Malabar coast. Pop. 10,000. It is the traditional field of St. Thomas's labours in India. Jews have been settled here since the fourth century.



Crowned Crane (*Balearica pavonina*)

astonishing for their great length. The common crane (*Grus cineræa*) has the general plumage ash-grey, the throat black, the rump ornamental with long, stiff, and curled feathers, the head with bristly feathers, legs black; length about 4 feet. It inhabits Europe, Asia, and the north of Africa. The crowned crane (*G. pavonina*, or *Balearica pavonina*) has the general plumage bluish ash-grey, the tail and primary quills black, the wing-coverts pure white; the head is crowned with a tuft of slender yellow feathers, which can be spread out at pleasure. It inhabits

Crank, a 'handle' on a machine shaft for turning it. It may be a separate piece of steel keyed on to the shaft, or it may be formed by suitably bending the shaft itself in a forge. Its purpose is to change longitudinal motion into circular motion, or vice versa.

Cranmer, Thomas (1489–1556), Archbishop of Canterbury. He was enthroned in 1533. Soon after he set the Papal authority at defiance by pronouncing sentence of divorce between Henry and Catherine, and confirming the king's marriage with Anne Boleyn. The Pope threatened excommunication, and an Act of Parliament was immediately passed for abolishing the Pope's supremacy, and declaring the king chief head of the Church of England. The archbishop zealously promoted the cause of the Reformation; and through his means the Bible was translated and read in churches, and monastic institutions were vigorously suppressed. In 1547 appeared the *Homilies* prepared under his direction, and in 1550 he published *Defence of the True and Catholic Doctrine of the Sacrament*. By his instrumentality the liturgy was drawn up and established by Act of Parliament. With others who had been most active in Lady Jane Grey's favour he was sent to the Tower on the accession of Mary. He was sentenced to be degraded and deprived of office. After this flattering promises were made, which induced him to sign a recantation of his alleged errors, and return, in fact, to the Roman Church. But when he was brought into St. Mary's Church, Oxford, to read his recantation in public, he calmly acknowledged that the fear of death had made him belie his conscience, and withdrew his recantation. He was immediately hurried to the stake, where he behaved with the resolution of a martyr.—Cf. A. F. Pollard, *T. Cranmer and the English Reformation, 1489–1556*.

Crannogs. See *Lake Dwellings*.

Cranston, a city, Rhode Island, U.S.A., standing on Providence River. It has manufactures of cotton goods, and is famous for its market gardens. Pop. 29,407.

Crashaw, Richard (1613–1649), English poet. *Epigrammata Sacra* appeared in 1634; *Steps to the Temple* and *The Delights of the Muses* were published in London in 1646; and a posthumous volume appeared at Paris in 1652, under

the title *Carmen Deo Nostro*. Crashaw, who was an ardent convert to Roman Catholicism, displayed considerable poetic genius in the treatment of religious subjects.

Crassulaceæ, the house-leek family, a natural order of polypetalous dicotyledons. It consists of succulent plants growing in hot, dry, exposed places in the more temperate parts of the world, but chiefly South Africa. Many species are cultivated in greenhouses. The flora of Britain contains about a dozen species.

Crassus, Marcus Licinius (115–53 B.C.), Roman triumvir. He took part with Sulla in the civil war; and as prætor, in 71 B.C., he defeated Spartacus and the revolted slaves at Rhegium. In 60 B.C. Cæsar, Pompey, and Crassus formed the first triumvirate. Five years later he again became consul, and obtaining Syria for his province he made war on the Parthians, but was defeated and slain at Carrhæ.

Cratinus (d. 422 B.C.), Athenian comic poet. Some fragments of his works remain. His last play, the *Putine* (Bottle), won the first prize for comedy when the *Clouds* of Aristophanes was third.

Crawford, Francis Marion (1854–1909), American novelist. His works include: *Mr. Isaacs*, *Saracinesca*, *Sant' Ilario*, *A Cigarette-maker's Romance*, *Love in Idleness*, *Soprano*, and *A Lady of Rome*.

Crayfish, a name of various crustaceous animals, the common crayfish being *Astacus fluviatilis*, the river lobster, a macrurous (long-tailed), ten-footed crustacean, resembling the lobster and inhabiting the fresh waters of Europe and Northern Asia. In the United States crayfish of the genera *Astacus* and *Cambärus* are common, and sometimes by their burrowing habits injure mill-dams and river-dikes, such as the levees of the Mississippi. See Plate *Crustacea*.

Crayons, coloured pencils, commonly manufactured from a fine paste of chalk or pipe-clay coloured with various pigments, and consolidated by means of gum or wax. A kind of *crayon painting* (or *pastel painting*) is practised to some extent, the colouring-matter in a soft state being rubbed on with the finger. Its chief advantages consist in the great facility of its execution, and the soft beauty and richness of colouring of effects so easily produced. The paper used has a specially granulated surface.

Cream of Tartar, or **Potassium Bitartrate** ($\text{KHC}_4\text{H}_4\text{O}_6$), exists in grapes, tamarinds, and other fruits. It is prepared from the crystalline crust (crude tartar or argol) deposited on the vessels in which grape juice has been fermented. It is employed in medicine for its diuretic, cathartic, and refrigerant properties; as a mordant in dyeing wool; and as an ingredient in baking-powder.

Cream Separator, a machine by means of which the maximum amount of fresh cream (free of casein) can be obtained. The essential part of the machine is a drum which revolves at the rate of several thousand revolutions per minute, and into which the milk is placed. The heavier milk is forced to the outside, and the lighter cream is left next the revolving axis, in which there is an outlet.

Creasy, Sir Edward Shepherd (1812–1878), English historian. In 1840 he was appointed professor of history at London University, and in 1860 was made Chief Justice of Ceylon. His principal works are: *The Rise and Progress of the British Constitution*, and *The Fifteen Decisive Battles of the World*.

Crébillon, Prosper Jolyot de (1674–1762), French writer of tragedy. His first play, *La Mort des Enfants de Brutus*, was rejected by the actors; but his next productions, *Idoménée* (1705) and *Atrée* (1707), were successful. These were followed by *Rhadamiste* (1711), *Xerxes* (1714), and *Semiramis* (1717).—His son, Claude Prosper (1707–1777), wrote *Le Sopha*, *Le Hasard du Coin du Feu*, and *Les Égaréments du Cœur et de l'Esprit*.

Crécy, a small town of France, in the department of Somme; pop. 1500. It is celebrated on account of a battle fought here in 1346 between the English and French, in which the English King, Edward III, was victorious.

Credit, in economics, is the postponement agreed on by the parties of the payment of a debt to a future day. It implies confidence of the creditor in the debtor. By means of a credit system a comparatively small stock of actual cash can be made to do duty for carrying on a number of different transactions; but it is indispensable for every good system of credit that cash should be instantly available. Public credit is the confidence which men entertain in the ability and disposition of a nation to make good its engagements

with its creditors; on the state of public credit depend the ease and expense of raising public loans. The term is also applied to the general credit of individuals in a nation. So we speak of the credit of a bank when general confidence is placed in its ability to redeem its notes, and the credit of a mercantile house rests on its supposed ability and probity, which induce men to trust to its engagements. Credit must be distinguished from capital, for credit is only a means of transferring the agents of production (land, labour, capital) from one individual to another and thus increasing their efficiency.—**BIBLIOGRAPHY**: W. G. L. Taylor, *The Credit System*; A. J. Wolfe, *Foreign Credits: a Study of the Foreign Credit Problem*; R. Benson, *State Credit and Banking during the War and After*.

Creed. The Apostles' and Nicene Creeds, together with the Athanasian Creed, are the most ancient authoritative Christian creeds, though numerous ancient formularies of faith are preserved in the writings of the early fathers, Irenæus, Origen, and Tertullian, which agree in substance, though with some diversity of expression. The Nicene Creed (intended for communicants) was so called from being adopted as the creed of the Church at the Council of Nicæa or Nice, A.D. 325, though its terms were subsequently somewhat altered. The Apostles' Creed (intended for catechumens) probably dates from the end of the fourth century; but there is no evidence of its being accepted in its present form till the middle of the eighth. The Athanasian Creed (intended for church teachers) was certainly not drawn up by St. Athanasius, but probably belongs to the fifth century, if not as late as the end of the eighth or beginning of the ninth century.—**BIBLIOGRAPHY**: P. Schaff, *Creeds of Christendom*; J. Pearson, *Exposition of the Creed*; S. G. Green, *The Christian Creed and the Creeds of Christendom*; W. A. Curtis, *History of Creeds*.

Creeks. See *Indians, American*.

Creepers, a family (Certhiidae) of birds which strongly resemble the woodpeckers in their habit of creeping on the stems of trees. The common creeper (*Certhia familiaris*) is European, but is represented by American species. It is a pretty and interesting little bird, which builds its nest usually in holes or crevices of trees.

Crefeld. See *Krefeld*.

Creighton, Mandell (1843-1901), English bishop and historian. In 1891 he was appointed to the see of Peterborough, and in 1897 became Bishop of London. His chief work is *History of the Papacy during the Reformation* (5 vols., 1882-1894). He also wrote: *Life of Simon de Montfort*, *The Age of Elizabeth*, *The Tudors and the Reformation*, *Life of Cardinal Wolsey*, and *Historical Essays and Reviews*.

Creil, a town of France, department of Oise, on the River Oise, with railway workshops and manufactures of iron goods, pottery, and glass. Pop. 10,214.

Crema, a fortified cathedral city of Northern Italy, province of Cremona, on the Serio. Pop. 11,411.

Cremation, the burning of the bodies of the dead, a practice which was frequent in ancient times instead of burial, and which is now advocated on hygienic grounds by many scientific men in Europe and America. The campaign opened in Italy, the first attempts being made by Brunniti, at Padua, in 1873. Various methods of cremation have been proposed, but by far the most satisfactory is the Siemens' process, a modification of a plan of Sir Henry Thompson.—**BIBLIOGRAPHY**: A. G. Cobb, *Earth-burial and Cremation*; A. C. Freeman, *Cremation in Great Britain and Abroad*.

Cremona, a city of Italy, capital of province of the same name, on the left bank of the Po. The most remarkable edifice is the cathedral, begun in 1107 and completed about 1491. It is noted for its façade in alternate courses of red and white marble. Cremona has considerable manufactures of silk, wool, and cotton. It was at one time celebrated for its violins, especially those made by Antonius Stradivarius. Pop. (1928), 65,305.—The province has an area of 685 sq. miles, and a pop. of (1928) 354,802.

Creole is the name which was originally given to all the descendants of Spaniards born in America and the West Indies. It is now used in a wider sense to signify the descendants of Europeans of any nation born in South America and the West Indies, as well as in some other localities.

Creosote, a mixture of substances obtained by distilling wood-tar or coal-tar. The products from the two kinds of tar should be carefully distinguished from each other. Coal-tar creosote is another

name for the heavy or creosote oils which distil over between 230° and 270° C. (see *Coal-tar Distillation*). Wood-tar creosote comes chiefly from beechwood. It is a highly refractive, colourless, oily liquid. It was first obtained in 1832.

Crescent, an emblem representing the moon in its first quarter. This emblem is of very high antiquity, being that of the Greek goddess Artemis or Diana. Since the establishment of the Ottomans in Europe it has been the universal emblem of their empire.

Cress, the name of several species of plants, most of them of the nat. ord. Cruciferae, of which water-cress (*Nasturtium officinale*) and common garden-cress (*Lepidium sativum*) are the best known. Water-cress grows on moist ground or near a river.

Crest. In heraldry the crest is a figure originally intended to represent the ornament of the helmet, but is now generally placed upon a wreath, coronet, or cap of maintenance, above both helmet and shield. The crest is considered a greater criterion of nobility than the coat of arms itself, and it is now commonly a piece of the arms.

Creswick, Thomas (1811-1869), English landscape painter. Among his great works are: *England*, *London Road a Hundred Years Ago*, and *The Weald of Kent*.

Cretaceous (or **Chalk**) **System**, in geology, the highest system of the Mesozoic group of strata, between the Jurassic and the Eocene systems. The name is derived from the frequent occurrence of the soft white limestone known as chalk. The Upper Cretaceous series in England and N.W. France consists, indeed, largely of chalk, with clays and sands below. Cretaceous sands are often rich in glauconite (greensands), and the following upward sequence has been established in S.E. England: Wealden beds (lacustrine), Lower Greensand, Gault Clay, Upper Greensand, Lower, Middle, and Upper Chalk. Continental geologists include in the Lower Cretaceous series all strata up to the top of the Gault. See Map, p. 205.

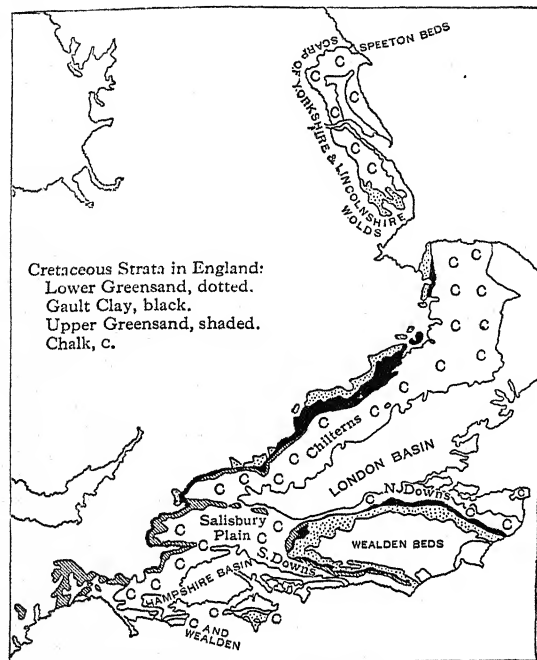
Crete, an island in the Mediterranean, 81 miles from the southern extremity of the Morea and 230 miles from the African coast, 160 miles long, 14 to 50 miles broad; area, 3327 sq. miles. High mountains, covered with forests, run through the

whole length of the island in several ranges. Psiloriti (the ancient *Ida*), 7670 feet high, is always covered with snow. The valleys and the shore lands on the south are extremely fertile, pasture is abundant, and the whole island is well watered. The

at various times under the Cilician pirates, the Romans, the Saracens, the Venetians, the Turks, and the Greeks. Prior to 1913 Crete was autonomous, but under Turkish suzerainty. In that year, however, it was

ceded to the Balkans, and by the Treaty of London and the Treaty of Bucharest became Greek. Crete is of great interest to archaeologists (see next article). — BIBLIOGRAPHY: J. H. Freece, *A Short Popular History of Crete*; James Baikie, *The Sea-Kings of Crete*.

Crete, Ancient Civilization of. Crete was the 'cradle' of pre-Greek or Ægean civilization, which has two phases, Minoan and Mycenaean. Minoan refers to the island culture, and has been named after the legendary lawgiver Minos; while Mycenaean has been so called because it is so well represented at Mycenæ; it is a late phase of Minoan. The culture of the second city of Troy was influenced by the early Minoan culture of Crete. Traces of contact with Egypt at various periods have enabled the archaeologists to frame a chronological system. Crete passed from its Age of Stone to its Bronze Age about 3000 B.C. With the introduction of bronze began the Minoan Age, which has been divided



principal products (grains, wine, oil, fruits, cotton, honey, flax, silk, cattle, &c.) are sufficient for the needs of a much larger population. Agriculture, education, in fact everything, is in a very backward state. Harbours are poor, though the Bay of Suda, near Canea, affords a safe haven. Inland transport is extremely bad. Exports are wine, olive-oil, and soap. The population is about 310,000 (275,000 Greeks, 35,000 Turks). The Greek Church flourishes, and the island is in every respect part of Greece. Canea is the capital, and other towns are Candio and Retimo. The island, colonized at a very early period by Egyptians and Anatolians, was the dominant power in the Ægean world and the centre of the so-called *Minoan* or *Ægean* civilization (see next article). It has been

into three periods—Early, Middle, and Late Minoan. Each of these periods has in turn been subdivided into First Early Minoan, Second Early Minoan, Third Early Minoan, First Middle Minoan, Second Middle Minoan, and so on to the Third Late Minoan period. Early Minoan II was parallel with the sixth dynasty of Egypt, and is dated c. 2500 B.C.; Middle Minoan II was parallel with the twelfth dynasty of Egypt, and is dated c. 2000 B.C.; and Late Minoan II was parallel with the eighteenth dynasty of Egypt, and is dated c. 1500 B.C. Late Minoan III, which began about 1450 B.C., came to an end about 1200 B.C., and was succeeded by the Homeric Age, when Mycenæ and Tiryns rose into prominence and the supremacy of Crete became a thing of

the past. Cretan civilization was a brilliant one, worthy to be classed with that of Egypt or Babylonia. Its palaces were as great achievements in architecture as the temples of Egypt. One of their remarkable features is a wonderful drainage system, with quite modern conveniences. A high degree of excellence was attained in art and especially in stone-carving and jewellery. Vases of steatite, alabaster, and marble were worked as thin as modern china. Ivory figures were carved with exquisite skill. The pictorial art, as revealed by frescoes, has a lyrical freedom and realism which strikes quite a modern note. Animals in plaster relief, carved in steatite or moulded in faience, are artistic achievements of the first order. The prosperity of Crete was based on the seafaring mode of life. The Minoans were the earliest traders on the Mediterranean, and traces of their activities have been found as far westward as Spain, and as far eastward as the shores of the Black Sea. A regular trade was maintained with Egypt and the Syrian coast and with Troy. — BIBLIOGRAPHY: Sir Arthur Evans, *Scripta Minoa*; *Reports on the Excavations of the Palace of Knossos*; Captain Spratt, *Travels and Researches in Crete*; R. M. Burrows, *The Discoveries in Crete*; H. B. Hawes, *Crete the Forerunner of Greece*.

Cretinism, a form of idiocy, due to defective action of the thyroid gland in infancy. An analogous condition, known as myxædema, may develop in the adult if the thyroid gland is destroyed by disease or injury. The disease seems to be endemic, and largely confined to valleys of mountainous regions. Cretins are usually affected with goitre. Associated with many physical infirmities and defects is a want of intellect which varies from absolute vacuity to a power of acquiring a little knowledge. Careful training may do much to help them, but the only really effective treatment is the provision of the thyroid secretion by feeding the cretin on extracts made from the thyroid glands of sheep or other animals.

Creuse, an inland department, France; area, 2163 sq. miles. It derives its name from the River Creuse, which traverses it diagonally. The surface is generally rugged, and the soil by no means fertile. Pop. (1926), 219,148.

Creuzot, Le, a town of Eastern France,

department of Saône-et-Loire, with extensive ironworks, the most complete in France. The works of Schneider & Co. are here. Pop. 38,396.

Crewe, Robert Offley Ashburton Crewe-Milnes, first Marquess of (1858–), British statesman. He was Lord-Lieutenant of Ireland from 1892 to 1895. Lord President of the Council from 1905 to 1908, and Secretary of State for the Colonies from 1908 to 1910. He became Secretary of State for India in 1910, and when Mr. Asquith formed the Coalition Government in 1915, Lord Crewe became Lord President of the Council, but resigned in Dec., 1916. He was Ambassador in Paris from 1922 till 1928.

Crewe, a municipal borough of England, in Cheshire, an important railway centre and the seat of enormous manufactories of railway plant. Pop. (1931), 46,061.

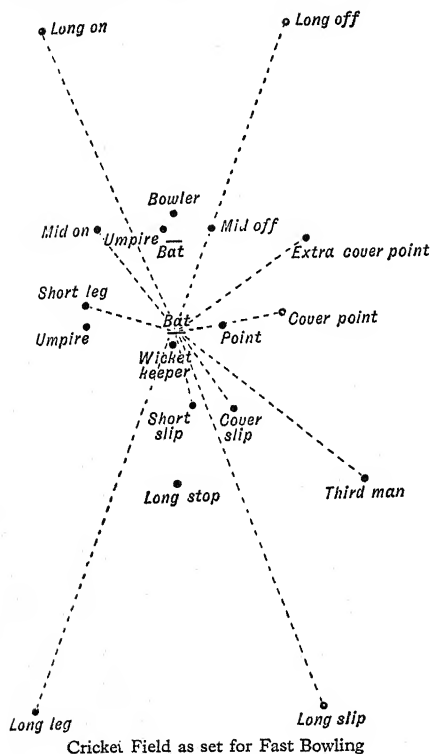
Criccieth, an old town and watering-place of Wales, Caernarvonshire, on Tremadoc Bay, the northern portion of Cardigan Bay. Pop. (1931), 1449.

Crichton, James, surnamed the *Admirable* (? 1560–1582). He was educated at the University of St. Andrews, and, according to the current accounts of him, before his twentieth year had run through the whole circle of the sciences, could speak and write to perfection ten different languages, and was equally distinguished for his skill in riding, fencing, singing, and playing upon all sorts of instruments. He visited Paris, Genoa, Venice, and Padua, challenging all scholars to learned disputations, vanquishing doctors of the universities, and disarming the most famous swordsmen of the time in fencing. He was afterwards tutor to a son of the Duke of Mantua, and is said to have been stabbed to the heart in a dastardly manner by his pupil.

Cricket, an insect of the genus *Gryllus*, order Orthoptera, of which the house-cricket, *Acheta (Gryllus) domestica*, the field-cricket, *Acheta (Gryllus) campestris*, the mole-cricket, *Gryllotalpa vulgaris*, are the best known. The house-cricket of Europe is about an inch long. By the friction of the peculiarly formed wing-covers the males produce their stridulous sound.

Cricket, the English national summer game. It is of great antiquity, and nowadays teams are to be found in almost every part of the Empire, particularly in

Australia and South Africa. The central governing body of cricket throughout the world is the Marylebone Cricket Club (the M.C.C.), with head-quarters at Lord's Cricket Ground, St. John's Wood Road, London. Cricket is played between two sides of eleven players, each side having two innings taken alternately except in

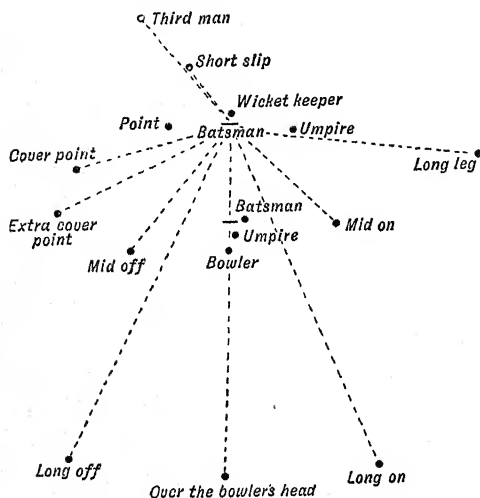


Any one of the positions, long on, extra cover point, long slip, short leg, or long stop may be occupied by the eleventh man.

certain circumstances when one side, which has scored less than its opponents, can be compelled to take its second innings immediately after the first. The wickets are pitched 22 yards apart, each consisting of three stumps, 27 inches high and 8 inches wide. In a line with the stumps are drawn whitewash marks 8 feet 8 inches long, known as the bowling

creases, and parallel to these and 4 feet from them are the popping creases. The stumps at each end are surmounted by two bails. To complete a run a batsman must have some part of his body or of his bat inside the popping crease. The bat, the blade of which is willow and the handle cane, must not be more than 4½ inches wide or 38 inches long. The ball, made of cork and twine covered with leather, must be between 9 and 9½ inches in circumference and 5½ and 5¾ ounces in weight. A bowler delivers six consecutive balls from one end, the umpire then calls 'over', and the bowler at the other end takes up the attack. A batsman may be out in several ways. He may be bowled or caught, or he may be outside the popping crease and be stumped by the wicket-keeper. If a batsman obstructs a ball which in the umpire's opinion was in a direct line with the wicket, then he is out 'leg before wicket' (l.b.w.). The disposition of the fielders depends a great deal on the type of bowler and on the nature of the wicket, but the following diagrams give a general idea of the setting of the field. First-class cricket comprises matches between the counties selected as first-class, teams from Oxford and Cambridge, the Services, and the M.C.C. The leading cricket schools are Eton, Harrow, Winchester, Repton, Tonbridge, Uppingham, and Marlborough, and these contribute the great mass of distinguished amateurs in first-class cricket. One of the most famous annual matches is that between the best amateurs and the best professionals ('Gentlemen v. Players'). London boasts two of the most important cricket grounds in the world, Lord's and the Oval. The latter is the head-quarters of the Surrey County Cricket Club. Lord's is the venue of a large number of regular classic fixtures, e.g. Oxford v. Cambridge, Eton v. Harrow, Army v. Navy, contests between some of the great public schools, as well as the M.C.C. matches and the international matches. Periodically there are matches with Australia either in that country or in England. In 1882 the wonderful success of the Australians led to the institution of the expression 'the Ashes' with reference to 'the death of English cricket'. At present England holds 'the Ashes', which she regained with an English team visiting Australia in 1932-3. The highest score of an eleven

in first-class cricket in England was 887 by Yorkshire against Warwickshire in 1896; the lowest, 12 by Northants against Gloucestershire in 1907. The highest individual score in first-class cricket in England was by A. C. Maclaren, who scored 424 in 1895, Lancashire v. Somersetshire. A. E. J. Collins, a schoolboy, in a house



Cricket Field as set for Slow Bowling

Any one of the positions, long leg, extra cover point, or over the bowler's head may be occupied by the eleventh man.

match at Clifton in 1899, scored 628 not out, which is the highest individual score in the history of the game. Tom Hayward, the Surrey professional, scored 3518 in the 1906 season, which is the greatest aggregate in first-class cricket in any one season. It is universally held that the late W. G. Grace may justly rank as the greatest cricketer of all time.—BIBLIOGRAPHY: A. G. Steel, Hon. R. H. Lyttelton, and others, *Cricket* (Badminton Library); P. F. Warner, *The Book of Cricket*.

Crieff, a burgh of Scotland, county Perth, beautifully situated on a slope above the Earn. It is a health-resort. The principal manufacture is woollens (shirtings, blankets, and tweeds). Pop. (1931), 5544.

Crimea, The, a peninsula of Southern

Russia, forming an autonomous republic of the R.S.F.S.R. (see *Russia*). It is attached to the mainland by the Isthmus of Perekop; area, 14,910 sq. miles. It is bounded by the Black Sea, the Putrid Sea, and the Sea of Azov. Three-fourths of the Crimea belongs to the region of steppes, but the other part, confined entirely to the south,

and stretching along the coast from west to east, abounds in beautiful mountain scenery. Here the valleys looking southward are luxuriant with vines and olive and mulberry plantations, while the northern slope gives a large yield in cereals and fruits. The climate, however, is unequal, and in winter is severe. The chief streams are the Salghir and the Alma. The most important of the productions, besides those already mentioned, are tobacco, flax, and hemp. Fine-wooled sheep, cattle, and horses are extensively reared. Pop. about 761,600. The capital of the republic is Simferopol. Sevastopol, Eupatoria, and Feodosia are important towns. The country, anciently inhabited by the Cimmerians, later consisted of various Greek settlements and minor kingdoms, and was ultimately seized by Turkey. In 1783 the Russians took possession of the country; and with a view to overawing the Turks the great naval arsenal of Sevastopol was begun in 1786. Its military resources were steadily developed up to the time of the Anglo-French campaign (see *Crimean War*) of 1854, when it fell into the hands of the Allies.

—BIBLIOGRAPHY: J. B. Telfer, *The Crimea and Transcaucasia*; Sir Evelyn Wood, *The Crimea in 1854 and 1894*.

Crimean War, the struggle between England, France, and Turkey on the one hand, and Russia on the other, which lasted from 1854 to 1856. The demand by Russia for a protectorate over the Greek Church throughout the Turkish Empire brought matters to a crisis. An ultimatum presented by Menshikov in May, 1853, was rejected by the Porte; the Russians occupied the Danubian principalities; and war was declared by the Porte in Oct., 1853, by France and England in 1854, and by Sardinia in 1855. A French and English fleet entered the Baltic and captured Bomarsund and one of

the Åland Islands, and in the south the Allies landed at Varna, under Lord Raglan and Marshal St. Arnaud as Commanders-in-Chief. It soon became obvious that the Crimea must be the seat of the war, and 50,000 French and English troops with 60,000 Turks were landed at Eupatoria (Sept., 1854). Five days later the battle of the Alma was won by the Allies (20th Sept.). The Russians attacked the English at Balaklava (25th Oct.), but were defeated with heavy loss. It was at this battle that the famous, but useless, charge was made by the Light Brigade. A second attack at Inkerman was again repulsed by the Allies. The bombardment of Sevastopol was continued, and in Sept., 1855, the French successfully stormed the Malakov, the simultaneous attack on the Redan by the British proving a failure. The Russians, however, then withdrew from the city to the north forts, and the Allies took possession. Overtures of peace were now gladly accepted by the Russians. A treaty was accordingly concluded at Paris on 27th April, 1856, by which the independence of the Ottoman Empire was guaranteed.—BIBLIOGRAPHY: A. W. Kinglake, *The Invasion of the Crimea*; Sir E. B. Hamley, *The War in the Crimea*.

Criminal Law, the law relating to crimes. The general theory of the common law is, that all wrongs are capable of being looked at in two ways: first, civil or private wrongs or *torts*; secondly, criminal or public wrongs. The former are to be redressed by civil actions instituted by the parties injured. The latter are redressed by the State acting in its sovereign capacity. The general description of the private wrongs is, that they comprehend those injuries which affect the rights and property of the individual, and terminate there; that of public wrongs or offences being, that they comprehend such acts as injure, not merely individuals, but the community at large, by endangering the peace, the comfort, the good order, the policy, and even the existence of society. In the first, therefore, so far as the law is concerned, the compensation of the individual whose rights have been infringed is held to be a sufficient atonement; but in the second class of offences it is demanded that the offender make satisfaction to the community as acting pre-judicially to its welfare. The exact boundaries between these classes are not,

however, always easy to be discerned, even in theory; for there are few private wrongs which do not exert an influence beyond the individual whom they directly injure. The divisions, torts and crimes, are thus not necessarily mutually exclusive. The basis of the criminal law of Great Britain is to be found in the common law supplemented by parliamentary enactments, many of which were passed in the eighteenth or nineteenth centuries. The law has been further added to by judicial decisions on the statutes. The aim of criminal law as at present constituted is both retributive and preventive.

The twentieth century has witnessed great advances through the passing of two important statutes, the Probation of Offenders Act, 1907, and the Prevention of Crimes Act, 1908. The former enabled the court in view of the age, health, character, &c., of an accused person to suspend sentence and release the offender on probation for a period not exceeding three years, and so to avoid branding as criminal one who may have made but a temporary lapse. The Criminal Justice Act, 1925, and Amendment Act, 1926, also deal with the question of probation. The Prevention of Crimes Act, 1908, established the system of Borstal institutions for detention of youthful offenders convicted of indictable offences. The law affecting Borstal institutions is further amended by the Criminal Justice Administration Act, 1914, and the Criminal Justice Act, 1925, and it is now possible for a police court to send a youthful offender convicted of certain offences to assizes or quarter sessions in order that sentence of detention in a Borstal Institution may be passed upon him.

Crimmitschau, a town, Saxony, Germany, on the Pleisse. The industries are mainly connected with the manufacture of woollen goods. Engines and chronometers are also made. Pop. (1925), 27,119.

Crinan Canal, a canal in Argyllshire, Scotland, cutting off the peninsula of Kintyre from the mainland, and greatly shortening the route from Glasgow to Oban; 9 miles long, 12 feet deep, admitting vessels of 200 tons.

Crinoidea, the encrinites or sea-lilies, a class of Echinodermata, consisting of animals attached during the whole or a portion of their lives to the bottom of the

deep sea by means of a calcareous jointed stem. Though comparatively few in number now, they lived in immense numbers in former ages, many carboniferous limestones being almost entirely made up of their calcareous columns and joints. The class also includes the widely distributed feather-stars, stalkless forms living at various depths. The rosy feather-star (*Antedon rosacea*) is not uncommon in British seas.

Crinoline, a kind of petticoat supported by steel hoops, and intended to distend or give a certain set to the skirt of a lady's dress. The crinoline came in about 1856, and was worn by women of all ranks. The immense bell-shaped crinolines fell into disuse about 1866.

Crispi, Francesco (1819–1901), Italian statesman. After the Italian union of 1861 he entered Parliament, and immediately made himself prominent as the leader of the Radical Left. In 1887 he succeeded Depretis as Premier, and proved a strong advocate of the Triple Alliance between Italy, Germany, and Austria. Although violently attacked, he remained in office until 1891, and again from 1893 till 1896, when, after the defeat of the Italians at Adowa, he was compelled to resign.—Cf. W. J. Stillman, *Francesco Crispi: Insurgent, Exile, Revolutionist, and Statesman*.

Cristobal, a seaport, Panama, at the Atlantic end of the canal. It has a large transit trade. The depth alongside the wharves is 41 feet, and there is accommodation for ships of 15,000 to 20,000 tons. There are ship stores, and bunkering and oil-fuel depots. Ample repair facilities and dry-docks are in the vicinity.

Criticism, Literary. Literary criticism is as old as literature itself. Among the Greeks criticism existed in practice long before it had even a name, but the true founder of Greek literary criticism was Aristotle. In his work *The Poetics* he laid down the rules of literary criticism, rules which still have their value even in modern times. Other important Greek critics were Theophrastus, Aristoxenus, Aristarchus, Zoilus, the critic of Homer; the critics of the Alexandrian school, Dionysius of Halicarnassus, Plutarch, Lucian, and especially Longinus, who left a work entitled *On the Sublime*. Rome followed in the traces of Greece, and Greek influence upon Roman literature

was paramount. Among Latin critics may be mentioned Cicero (*De Oratore*); Horace, who set forth the canons of poetic art in a pleasant and polished manner in his *Ars Poetica*; and especially Fabius Quintilianus (A.D. 118), whose *Institutiones Oratoriae* is by far the most important Roman contribution to literary criticism. There was little criticism during the Middle Ages. The first great literary critic who arose towards the end of the Dark Ages was Dante. In his work *De Vulgari Eloquentia* he treated of the vulgar tongue which we acquire without any rule, and which he considers nobler because more natural. The Italian Renaissance established the æsthetic foundations of the vast literature which the Revival of Learning had discovered, and restored the element of beauty to its rightful place. The entire literary criticism of the Italian Renaissance is influenced by Aristotelianism (Aristotle's *Poetics*), by humanism, classicism, or the imitation of the classics, and by rationalism, or the authority of reason. The Italian Renaissance produced such literary critics as Vida (*Poetics*, 1527), Scaliger (*Poetics*, 1561), Castelvetro (*Poetica*, 1570), Tasso (*Discorsi*, 1587), and others. From Italy of the Renaissance the classical traditions were passed on to France, England, and the rest of Europe. In France literary criticism began with Du Bellay, Ronsard, and the other members of the Pleiade. It was inaugurated with the translation of Horace's *Ars Poetica* into the vernacular. Joachim du Bellay wrote his *Défense et Illustration de la Langue Française* (1549), and Vauquelin de la Fresnaye published his *Art Poétique* (1605). Literary criticism in England during the sixteenth and seventeenth centuries began with Coxe's *Arte or Crafte of Rhetoryke* (1524), but the first critic of importance was Thomas Wilson (*Arte of Rhetoryke*, 1553). He was followed by Roger Ascham (*The Schoolmaster*, 1563–1568). G. Gascoigne wrote his *Notes of Instruction concerning the making of Poesie*, and Gosson wrote his famous *Schoole of Abuse* (1579), wherein he poured out abuse against the stage. Gosson's attacks called forth the reply of Sir Philip Sidney (*The Defence of Poesy*). This is a summary of the literary criticism of the Italian Renaissance, and the author invokes the authority of Aristotle in his definition of poetry. Mention must also

be made of George Puttenham (*Arte of English Poesie*, 1589), and especially of Ben Jonson, whose doctrines and ideas about poetry are derived from Aristotle through the medium of Heinsius. By the end of the sixteenth century the authority in literary criticism had passed from Italy to France, and for two centuries Malherbe determined the course of French poetry. Among the prominent French literary critics of modern times may be mentioned Corneille, Boileau, Voltaire, Diderot, and Sainte-Beuve. In the first half of the seventeenth century England was occupied with civil and religious wars, and there was little time for questions of literature and literary criticism. Then Dryden, the greatest English man of letters of his day, came, and, calling attention to the new developments of literature, pleaded for the rights of personal judgment. From being moral with Addison, literary criticism was general with Dr. Johnson, who became the literary autocrat of his country. The dawn of the Romantic movement first rose in England, where the revolt was led by Wordsworth. Among the most noteworthy modern English literary critics are Matthew Arnold, Walter Pater, Macaulay, Swinburne, Leslie Stephen, and the historian of literary criticism, George Saintsbury. The most noteworthy critics of Germany are Goethe, Schlegels, Creuzer, Humboldt, Wolf, Nietzsche, and others.—BIBLIOGRAPHY: C. M. Gayley and F. N. Scott, *Introduction to the Methods and Materials of Literary Criticism*; G. E. B. Saintsbury, *History of Criticism and Literary Taste in Europe*; J. E. Spingarn, *History of Literary Criticism in the Renaissance*.

Croatia-Slavonia, a province of Yugoslavia (the Serb, Croat, and Slovene kingdom), formerly part of Hungary. It is partly bounded by the Adriatic, Dalmatia, and Bosnia. The Drava and the Sava form part of the frontier. The surface is irregular and in the south is unfertile. Barley and oats are grown, but the country is pastoral rather than arable. The inhabitants are principally Slavs (Croats and Serbs). Three-fourths of the population are Roman Catholics, while the rest are mainly Greek Christians. The area is 16,360 sq. miles, and the pop. 2,739,593. Under the Empire, Croatia-

Slavonia was undeveloped, but since 1918 it has made great progress. The chief towns are Zagreb, Osijek, Zemun, and Karlovac. The Croats invaded and settled the area in 640. For a time the state was independent, but since 1091 it has generally belonged to Hungary. See *Yugoslavia*.

Croce, Benedetto (1866–), Italian philosopher and critic. The cardinal point of Croce's philosophy is a distinction between logic and intuition, the former dealing with the apprehension of universals, the latter with the apprehension of the particular, the individual. The act of intuition is the act of expression, and creative art is therefore, according to Croce, intuitive, as it is the act of expression in the mind of the artist. His works include: *Filosofia della spirito*, in three parts; *Estetica, Logica, and Etica*, all translated into English; *Esthetic, as Science of Expression and General Linguistic*; *What is Living and what is Dead of the Philosophy of Hegel*; *The Philosophy of Giambattista Vico*; *Historical Materialism and the Economics of Karl Marx*.

Crockett, Samuel Rutherford (1859–1914), Scottish novelist. *The Stickit Minister*, which appeared in 1893, first made his name known. Since then he gave to the public a number of tales and sketches, including: *The Raiders*, *The Lilac Sun-bonnet*, *Sweetheart Travellers*, *Maid Margaret*, and *Red Cap Tales*.

Crocodile, a genus, family, and order of saurian reptiles. The families now existing are the Alligatoridae, Crocodilidae, and Gavialidae. The alligators are all New World forms. The gavial proper (*Gavialis gangeticus*) is confined to the East Indies. The crocodile of the Nile (*Crocodilus vulgaris*) is the best-known member of the order; another species (*C. palustris*) is met with in South Asia, Sunda, and the Moluccas. The crocodile is formidable owing to its great size and strength, but its short legs and great, huge body render it on land most ungainly. It is exclusively carnivorous, and always prefers its food in a state of putrefaction. Crocodiles are still common enough in the River Senegal, the Congo, and the Niger. They grow sometimes to a length of 30 feet, and apparently live to a vast age.

Crocus, a genus of plants of the order Iridaceae, of which there are about seventy species, nearly all natives of Southern

Europe and the Levant. They may be divided into *vernal* and *autumnal*. Among the vernal crocuses are the white and purple *C. vernus*; *C. versicolor*, distinguished by the yellow tube of its flower bearded with hairs, and its sweet scent; *C. biflorus*, the Scotch crocus, with beautiful pencilled sepals, and clear or bluish-white petals. Among the autumnal species are *C. nudiflorus* and *C. sativus*.

Cræsus, the last King of Lydia, son of Alyattes, whom he succeeded in 560 B.C. His riches, obtained chiefly from mines and the gold-dust of the River Pactolus, were greater than those of any king before him, so that his wealth became proverbial. Having entered upon war with Cyrus, he was taken prisoner in his capital, Sardis (546 B.C.).

Croker, John Wilson (1780-1857), English writer and politician. He was appointed in 1809 to the post of Secretary to the Admiralty, which he retained till the reign of William IV. He was one of the founders of the *Quarterly Review*, and one of its ablest contributors, though his articles display frequent malevolence. His other writings include an edition of Boswell's *Life of Johnson*, and *Stories for Children from the History of England*, from which Sir Walter Scott derived his idea of *Tales of a Grandfather*.

Croker, Thomas Crofton (1798-1854), Irish collector of folk-lore. His best-known work is his *Fairy Legends and Traditions of the South of Ireland* (1825).

Croll, James (1821-1890), Scottish geologist. He wrote *The Philosophy of Theism; Climate and Time in their Geological Relations*, his most important work; *Discussions on Climate and Cosmology; Stellar Evolution*; and *The Philosophical Basis of Evolution*.

Cromarty, a burgh and seaport of Scotland, at the extremity of the peninsula between the Moray and the Cromarty Firths. Fishing is the chief industry. It is a naval air-station. Pop. (1931), 837.—The county of Cromarty is now incorporated in the county of Ross.

Cromarty Firth, an inlet of the sea running into the united county of Ross and Cromarty in a south-westerly direction; length, about 18 miles; average breadth, 2 to 5 miles. Its entrance, between two wooded headlands called the Sutors of Cromarty, is about a mile wide. The firth affords excellent shelter for

shipping. On its shores are the towns of Cromarty, Invergordon, and Dingwall.

Crome, John (1769-1821), English artist. He excelled in depicting the scenery of his native county, Norfolk, and especially in his handling of trees; and his high place among British landscape painters is now universally acknowledged. His *Oak at Poringland*; *Mousehold Heath*; and *Chapel Fields, Norwich* are in the National Gallery.

Cromer, Evelyn Baring, first Earl of (1841-1917), British statesman and diplomatist. In 1879 he was appointed Controller-General in Egypt. He found the country on the verge of bankruptcy, and left it in a highly prosperous condition. It was due to his administration that the Sudan was restored to the rule of Egypt, and he was largely responsible for the success of the Omdurman campaign. His publications include: *Modern Egypt* (1908), *Paraphrases and Translations from the Greek*, and *Political and Literary Essays*.

Cromer, a seaport and bathing-place of England, Norfolk. Pop. (1931), 4177.

Crompton, Samuel (1758-1827), inventor of the mule-jenny. When only twenty-one years of age he invented his machine for spinning cotton, which was called a *mule* from its combining the principles of Hargreaves' spinning-jenny and Arkwright's roller-frame, both invented a few years previously. The sum of £5000, voted to him by Parliament in 1812, was almost all the remuneration which he received for an invention which contributed so essentially to the development of British manufactures.

Crompton, an urban district of England, Lancashire, included in the burgh of Oldham. Pop. (1931), 14,750.

Cromwell, Oliver (1599-1658), Lord-Protector of the Commonwealth of England, Scotland, and Ireland. The first really authentic fact in his biography is his leaving school at Huntingdon and entering Sidney-Sussex College, Cambridge, 23rd April, 1616. On the death of his father in 1617 he returned home, and in 1620 married Elizabeth, daughter of Sir James Bourchier. In 1628 he was member of Parliament for the borough of Huntingdon, to which he returned on the dissolution in 1629. In the summer of 1642 he was actively engaged in raising and drilling volunteers for the Parliamentary party, in view of the impending

struggle with the king. He served as captain and colonel in the earlier part of the war, doing good service with his troop of horse at Edgehill; and it was his energy and ability which made the Eastern Association the most efficient of those formed for mutual defence. In 1644 he led the victorious left at Marston Moor, deciding the result of the battle. As the result of the discipline introduced by Cromwell, the decisive victory of Naseby was gained in 1645, and Leicester, Taunton, Bridgewater, Bristol, Devizes, Winchester, and Dartmouth fell into the hands of the Parliament. On the occasion of the surrender of Charles by the Scottish army in 1646, Cromwell was one of the Commissioners. Though at first supporting Parliament in its wish to disband the army, which refused to lay down its arms till the freedom of the nation was established, he afterwards saw reason to decide in favour of the latter course. Hastily suppressing the Welsh rising, he marched against the Scottish Royalists, whom he defeated with a much inferior force at Preston (17th Aug., 1648). Then followed the tragedy of the king's execution, Cromwell's name standing third in order in the death-warrant. Affairs in Ireland demanding his presence, he was appointed Lord-Lieutenant and Commander-in-Chief; and by making a terrible example of Drogheda (Sept., 1649), crushed the Royalist party in that country within six months. Resigning the command to Ireton, he undertook, at the request of the Parliament, a similar expedition against Scotland, where Charles II had been proclaimed king. With an army greatly reduced by sickness, he saved himself from almost inevitable disaster by the splendid victory at Dunbar (3rd Sept., 1650), and a year later put an end to the struggle by his total defeat of the Royalists at Worcester (3rd Sept., 1651). For these services he was rewarded with an estate of £4000 a year, besides other honours.

The Rump Parliament, as the remnant of the Long Parliament was called, had become worse than useless, and on 20th April, 1653, Cromwell, with 300 soldiers, dispersed that body. He then summoned a Council of State, consisting mainly of his principal officers, which finally chose a Parliament of persons selected from the three kingdoms, nicknamed *Barebone's Parliament*, or the *Little Parliament*.

Fifteen months after a new annual Parliament was chosen; but Cromwell soon prevailed on this body to place the charge of the Commonwealth in his hands. The chief power now devolving again upon the Council of Officers (12th Dec., 1653), they declared Oliver Cromwell sole Governor of the Commonwealth, under the name of *Lord-Protector*, with an assistant council of twenty-one men. Early in 1657, however, he peremptorily dissolved the House, which had rejected the authority of the second chamber. Abroad his influence still increased, reaching its full height after the victory of Dunkirk in June, 1658. But his masterly administration was not effected without severe strain, and upon the death of his favourite daughter, Elizabeth Claypole, in the beginning of Aug., 1658, his health began to fail him. Towards the end of the month he was confined to his room from a tertian fever, and on 3rd Sept., 1658, died at Whitehall, in the sixtieth year of his age. Great as a general, Cromwell was still greater as a civil ruler. He lived in a simple and retired way, like a private man, and was abstemious, temperate, indefatigably industrious, and exact in his official duties. He possessed extraordinary penetration and knowledge of human nature; and devised the boldest plans with a quickness equalled only by the decision with which he executed them. No obstacle deterred him; and he was never at a loss for expedients. Cool and reserved, he patiently waited for the favourable moment, and never failed to make use of it. In his religious views he was a tolerant Calvinist. He was about 5 feet 10 inches in height, his body "well compact and strong"; and his head and face, though wanting in refinement, were impressive in their unmistakable strength.

He had appointed his eldest son, Richard, his successor; but the republican and religious fanaticism of the army and officers, with Fleetwood at their head, compelled Richard to dissolve Parliament; and a few days after he voluntarily abdicated the protectorship, 22nd April, 1659. His brother Henry, who from 1654 had governed Ireland in tranquillity, followed the example of Richard, and died in privacy in England. At the Restoration Richard went to the Continent until 1680, when he assumed the name of *Clark*, and passed the remainder of his days in tranquil seclusion at Cheshunt, Hertfordshire. He

died in 1712, at the age of eighty-six.—**BIBLIOGRAPHY:** T. Carlyle, *Letters and Speeches of Oliver Cromwell*; S. R. Gardiner, *Oliver Cromwell*; Lord Morley, *Oliver Cromwell*; Sir C. H. Firth, *The Last Years of the Protectorate*.

Cromwell, Thomas (1485–1540), Earl of Essex. After Wolsey's death he was taken into the king's service, and in 1534 became principal Secretary of State and Master of the Rolls. In 1535 he was appointed Visitor-General of all the monasteries in England, in order to suppress them. On the abolition of the Pope's supremacy he was created King's Vicar-General, and used all his influence to promote the Reformation. He at length fell into disgrace with the king for the part he took in promoting his marriage with Anne of Cleves, and was arrested on a charge of treason and beheaded on Tower Hill.

Cronje, Piet Arnoldus (1835–1911), Boer general. He was leader of the Boers that captured the 'Jameson raiders' at Krugersdorp; repulsed Methuen's force at Magersfontein, but was surrounded at Paardeberg and had to surrender (27th Feb., 1900) with 4300 men, being afterwards sent a prisoner to St. Helena.

Cronstadt, a maritime fortress of Russia, about 20 miles west of Leningrad, in the narrowest part of the Gulf of Finland, opposite to the mouth of the Neva, on a long, narrow, rocky island. It was founded by Peter the Great in 1710, and has a naval arsenal, a cannon-foundry, building-yards, and docks. The harbour consists of three separate basins—a merchant haven with a depth of 25 feet, a central haven for the repair of ships of war, and the war haven, all of which are defended by strong fortifications. Pop. 68,273.

Cronus, in ancient Greek mythology, a son of Uranus and Ge (Heaven and Earth), and youngest of the Titans. He received the government of the world after Uranus was deprived of it, and was in turn deposed by Zeus.

Crook, an urban district of England, Durham, with extensive collieries. Pop. (1931), 11,690.

Crooked Island, one of the Bahamas, 18 miles long and 8 miles wide. Pop. 1481. Aeklin's Island, another member of the Crooked Group, has a pop. of 1811.

Crookes, Sir William (1832–1919),

English chemist and physicist. After some experience as a professor of chemistry, he founded the *Chemical News* in 1859. He was elected a Fellow of the Royal Society in 1863, was knighted in 1897, and next year was president of the British Association. He made important researches in molecular physics, and was one of the first to investigate the cathode rays (see *Electron*; *Radiometer*; *Vacuum Tube*). He was widely known as a spiritualist. Among his works are: *Handbook of Dyeing and Calico-printing*, *Researches in Modern Spiritualism*, and *Psychic Force and Modern Spiritualism*.

Croquet, an open-air game played on a lawn measuring 35 yards by 28 yards. Six iron hoops (4 inches wide) are placed one near each corner and two in the centre. Midway between the two top hoops is a peg marking the winning-place, and a similar peg at the bottom shows the turning-point. Each player or set of players has a mallet and a ball, and the aim of the game is to drive the balls through the hoops in a certain order and to prevent the opposing side from doing so. The first player to complete the course and touch the winning-peg with his ball is the victor.—Cf. A. E. Mainwaring, *A.B.C. of Croquet*.

Crosier, or **Crozier**, the staff borne by some of the higher dignitaries in the Roman Catholic and other Churches. The original form of the staff resembled a shepherd's crook, but from the middle of the fourteenth century the archbishops began to carry, sometimes in addition to the pastoral crook, sometimes instead of it, a crosier terminating in a cross or double cross. The crosier is carried by bishops and archbishops themselves only in procession and when pronouncing benediction; on all other occasions it is carried before them by a priest.

Cross, one straight body laid at any angle across another, or a symbol of similar shape. Among the ancients a piece of wood fastened across a tree or upright post formed a cross, on which were executed criminals of the worst class. It had therefore a place analogous to that of the modern gallows as an instrument of infamous punishment until it acquired honour from the crucifixion of Christ. It did not, however, become an object of adoration until after the alleged discovery of the true cross by the Empress

Helena (A.D. 326). Since its adoption by Christianity it has undergone many modifications of shape, and has been employed in a variety of ways for ornaments, badges, and heraldic bearings. — BIBLIOGRAPHY: J. D. Parsons, *The Non-Christian Cross*; W. W. Seymour, *The Cross in Tradition, History, and Art*.

Crossbill (*Loxia*), a genus of birds of the finch family, deriving their name from a peculiarity of their bill, which is so constructed as to enable them to extract with ease the seeds of the pine from underneath the scales of the cones. They build and also breed at all seasons of the year. The common crossbill (*L. curvirostra*) is found in the northern countries of Europe. It is from 6 to 6½ inches in length.

Crotch, William (1775–1847), English musical composer. In 1822 he became principal of the Royal Academy of Music. He left a large number of compositions, more especially for the organ, piano, and voice, and three technical treatises.

Croton, a genus of herbaceous plants, shrubs and trees, ord. Euphorbiaceæ. There are many species, most of which are of considerable economic importance. See *Croton-oil*.

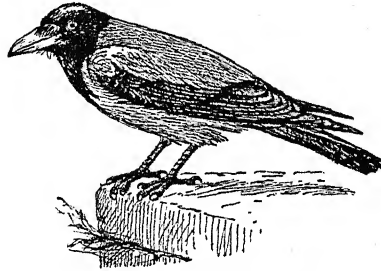
Croton (the modern Cotrone), in ancient geography, a Greek republic in South Italy, famous for its athletes.

Croton-oil, a vegetable oil expressed from the seeds of the *Croton Tiglium*. It is an extremely powerful cathartic, and must be used with great care. It is used as a counter-irritant in neuralgia.

Croup, a disease of children which may be of two kinds, *membranous* and *spasmodic*. *Membranous* croup is simply diphtheria affecting the larynx (see *Diphtheria*). It is a severe and often dangerous illness, and tracheotomy (q.v.) may be necessary. Anti-toxin should always be given. *Spasmodic* croup is most common in children of between two and five. An attack, the characteristics of which are difficulty of breathing, a 'croupy' cough, and varying degrees of restlessness, may come on suddenly and pass off gradually in a few hours. During an attack the child should be put in a hot bath and an emetic given. Care must be taken to distinguish between the two conditions.

Crow (*Corvus*), a genus of birds, type of the family Corvidæ, of which the British

species are the carrion-crow, the hooded crow, the raven (q.v.), the rook (q.v.), and the jackdaw (q.v.). The carrion-crow (*C. corone*) is about 18 inches long with a glossy blue-black plumage. It feeds on carrion and eats all kinds of small animals. They are not gregarious birds, and prefer isolated nesting. The American crow (*C. americanus*) is similar to the foregoing, but is smaller and somewhat gregarious; another



Hooded Crow (*Corvus cornix*)

variety is the fish-crow, found on the coasts of the southern states. The hooded, Royston, or grey-backed crow (*C. cornix*) is somewhat larger than the rook, with a smoke-grey body and in many respects like the carrion-crow.

Crowberry, or **Crakeberry**, a plant like the heaths, with a black, edible berry sometimes used as a purple dye, and found in Northern Europe and Asia. The red crowberry grows in the neighbourhood of the Straits of Magellan.

Crowe, Sir Joseph Archer (1825–1896), English journalist, diplomatist, and writer on art. He wrote the following works in collaboration with Signor Cavalcaselle: *Early Flemish Painters*, *History of Painting in Italy*, *History of Painting in North Italy*, *Life of Titian*, and *Life of Raphael*. He also published (1895) *Reminiscences of Thirty-five Years of my Life*.

Crowland, a town in Lincolnshire with a curious triangular bridge. Pop. 2809.

Crown, a circular ornament for the head. As now used the name is limited to the headdress worn by royal personages as a badge of sovereignty. Alexander the Great, who followed the Persian usage, first introduced the crown into Greece as a symbol of royalty. Antony wore a crown in Egypt, and the Roman emperors also wore crowns of various forms, from

the plain golden fillet to the radiated or rayed crown. In modern States they were also of various forms until heralds devised a regular series to mark the grades of rank from the imperial crown to the baron's coronet (see *Coronet*). The English crown has been gradually built up from the plain circlet with four trefoil heads worn by William the Conqueror. This form was elaborated and jewelled, and finally arched in with jewelled bands surmounted by the cross and sceptre. As at present existing the crown of England is a gold circle, adorned with pearls and precious stones, having alternately four Maltese crosses and four fleurs-de-lis. From the top of the crosses rise imperial arches, closing under a mound and cross. The whole covers a crimson velvet cap with an ermine border.

Crown Lands, the lands belonging to the British Crown. These are now surrendered to the country at the beginning of every sovereign's reign in return for an allowance (the Civil List) fixed at a certain amount for the reign by Parliament. They are placed under commissioners, and the revenue derived from them becomes part of the consolidated fund. For the year ending March, 1929, the net revenue of the Crown lands was £1,210,000.

Croydon, a county borough, England, Surrey, 10 miles south of London, of which it is practically a suburb. The town is a favourite residential place. A magnificent air-port was opened in 1928. Pop. (1931), 233,115.

Crozet Islands, a group of four uninhabited islands in the South Indian Ocean, between Kerguelen and Prince Edward Islands. They are all of volcanic origin, and the largest, Possession Island, is about 20 miles long by 10 miles broad.

Crozier. See *Crosier*.

Cruciferae, a very extensive natural order of dicotyledonous plants, consisting of herbs which all have flowers with six stamens, two of which are short, and four sepals and petals, the spreading limbs of which form a Maltese cross. The mustard, water-cress, turnip, cabbage, scurvy-grass, radish, and horse-radish belong to this family; also the wall-flower, stock, and candytuft.

Crucifix, a cross bearing the figure of Christ. As a rule, the figures on the most ancient crucifixes were not carved, but were engraved on gold, silver, or iron

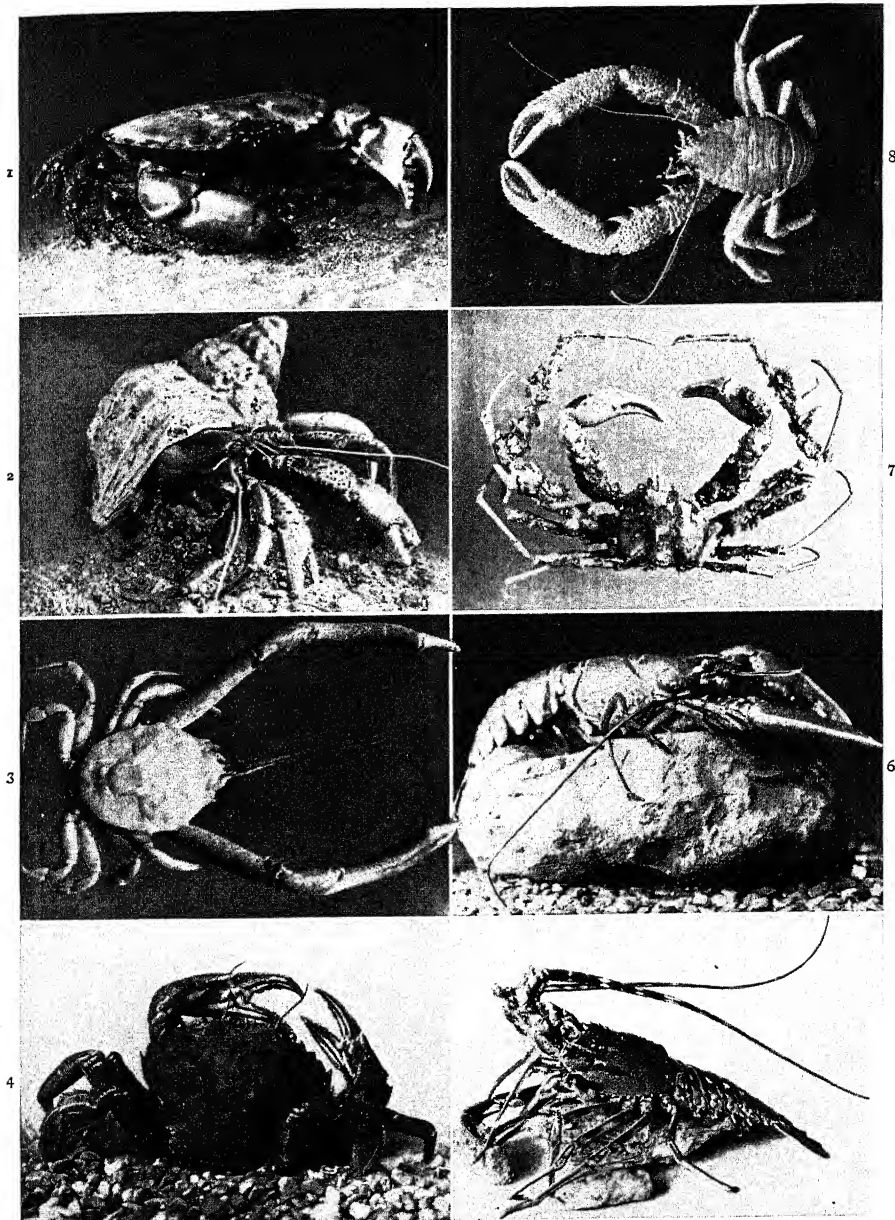
crosses. At a later period they were painted on wood, and it is only in the ninth century, in the pontificate of Leo III, that the figure of Christ appears carved upon the cross in bas-relief.

Cruden, Alexander (1701–1770), author of the well-known concordance to the Bible. His great work appeared in 1737. Three editions of the *Concordance* appeared in his lifetime, and he was also the author of *A Scripture Dictionary, or Guide to the Holy Scriptures*; and *The History and Excellency of the Scriptures*.

Cruikshank, George (1792–1878), the greatest of English pictorial satirists after Hogarth. He began early as a political satirist, contributing plates regularly in 1811 to *The Scourge*. In 1821 and the succeeding years appeared his illustrations of such popular books as Pierce Egan's *Tom and Jerry*, Maxwell's *History of the Irish Rebellion*, Grimm's *Fairy Tales*, Peter Schlemihl, Baron Munchausen, Defoe's *History of the Plague*, Scott's *Demonology and Witchcraft*, and *The Ingoldsby Legends*. In 1837 he commenced in *Bentley's Miscellany* his famous series of etchings on steel illustrative of Dickens's *Oliver Twist*, followed two years later by those for Ainsworth's *Jack Sheppard*, and then by those for *Windsor Castle* and *The Tower of London*. Having connected himself with the temperance movement, he produced *The Bottle*, a powerful and popular series of designs. His temperance connexion and his absurd claims to having suggested the idea of Dickens's *Oliver Twist* undermined his artistic reputation.

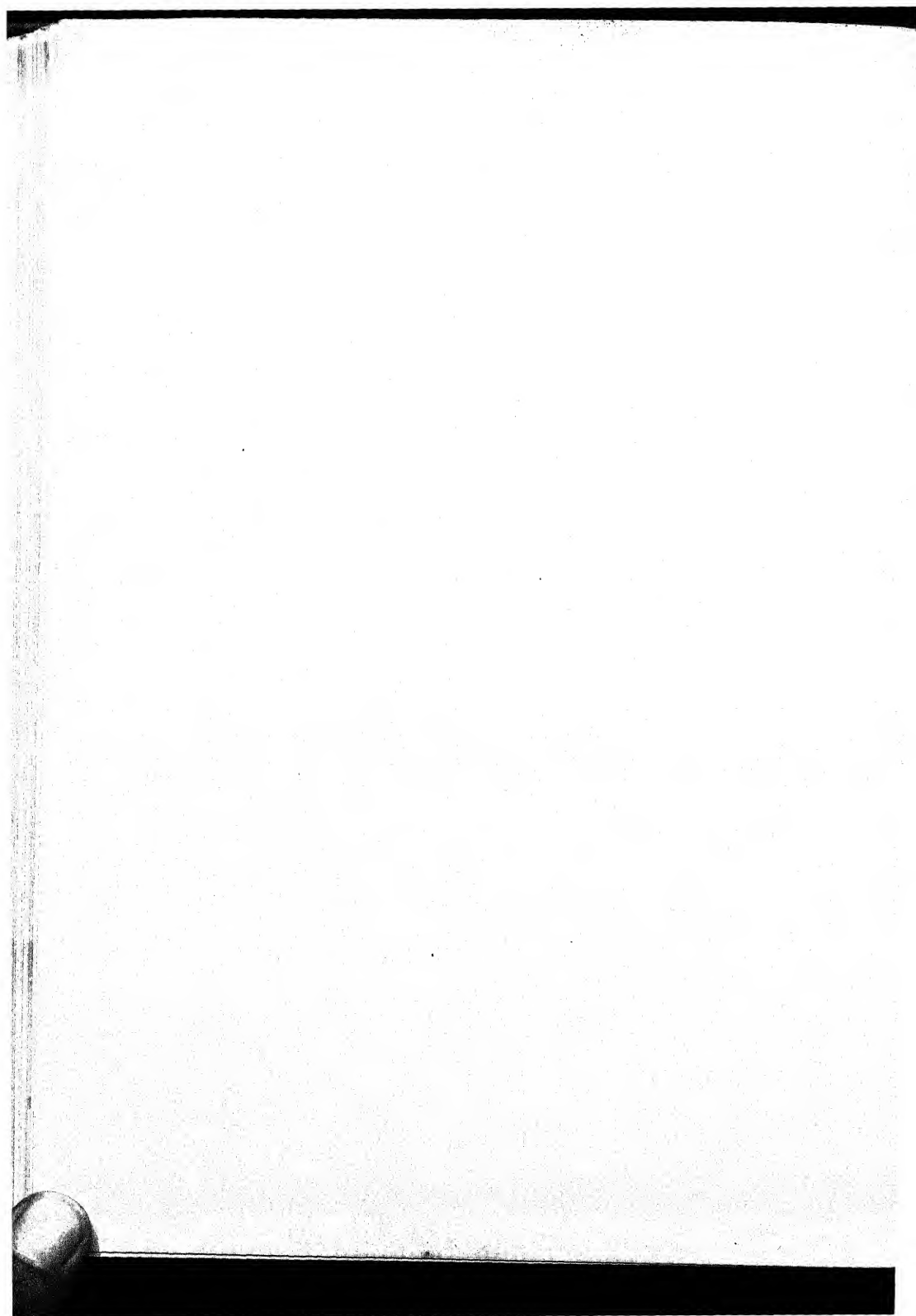
Crusades, the wars carried on by the Christian nations of the West, from the end of the eleventh till the latter half of the thirteenth century, for the conquest of Palestine. They were called *Crusades* because the warriors wore the sign of the cross. The immediate cause of the *first Crusade* was the preaching of Peter the Hermit, who gave Pope Urban II a description of the unhappy situation of Christians in the East, and presented a petition for assistance from the Patriarch of Jerusalem. The Crusaders, 80,000 in number, traversed Germany, Hungary, and the Byzantine Empire, passed over into Asia Minor, conquered Nicea in June, 1097, and shortly after fought the first pitched battle at Dorylaeum, being completely victorious after a severe contest. They then marched through Asia Minor

BRITISH CRUSTACEA



1. Great or Edible Crab. 2. Hermit Crab. 3. Masked Crab. 4. Velvet Fiddler Crab. 5. Crayfish.
6. Lobster. 7. Dorset Spider Crab. 8. Galathea Crab or "Squat Lobster".

Photographs by F. Martin Duncan, F.R.M.S., F.Z.S.



upon Antioch, which, with the exception of the citadel, fell into their hands by treachery in June, 1098. After remaining nearly a year in the neighbourhood of Antioch they commenced, in May, 1099, their march against Jerusalem, the siege of which they commenced in June. Their numbers were now reduced to little more than 20,000 men; but after a fierce struggle the town was taken by storm on 15th July, and Godfrey of Bouillon was chosen King of Jerusalem. At his death, in 1100, he was succeeded by his brother Baldwin.

The *second* great and regularly conducted Crusade was occasioned by the loss of Edessa (Dec., 1144). In 1147 the German Emperor Conrad III and Louis VII of France led large forces to the East, but returned without accomplishing anything in 1149.

The *third* Crusade was undertaken after the capture of Jerusalem by Saladin in 1187, the monarchs Frederick I (Barbarossa) of Germany, Philip Augustus of France, and Richard I (Cœur de Lion) of England leading their armies in person. Philip joined the other Crusaders before Acre on 18th April, 1191; but Richard, whose fleet was separated by a storm, went to Cyprus, and, dispossessing Isaac Comnenus, made himself king. It was not till the 8th of June that he reached Acre, which surrendered a month later. Jealousies, however, arose between the monarchs, and within a few weeks after the fall of Acre the French king returned to Europe. Richard, now sole leader of the expedition, defeated Saladin and occupied Jaffa or Joppa; but having twice vainly set out with the design of besieging Jerusalem, he concluded (2nd Sept., 1192) a truce of three years and three months with Saladin, who agreed that pilgrims should be free to visit the Holy Sepulchre, and that the whole sea-coast from Tyre to Jaffa (including the important fortress of Acre) should belong to the Crusaders.

The *fourth* Crusade was set on foot by Pope Innocent III. The Crusaders assembled at Venice in the spring of 1202, but were diverted from their original purpose by the sack of Constantinople and the establishment of a Latin Empire there (1204).

The *fifth* Crusade, undertaken by Andreas of Hungary in 1217, had little other

result than the temporary occupation of the Nile delta.

The *sixth* Crusade was that of Frederick II, Emperor of Germany. He concluded a useless truce of ten years, got himself crowned at Jerusalem, and returned in 1229.

The *seventh* and *eighth* Crusades were led by St. Louis of France (Louis IX) in person. He took Damietta in June, 1249, and marched up the Nile, but was compelled to retreat, and finally to surrender with his whole army. The second expedition of Louis was still more disastrous in its results than the first. He landed his army in 1270 on the northern coast of Africa; but he himself and a large number of his knights died before Tunis, and the majority of the French Crusaders returned home. The capture of Acre by the Sultan of Egypt in 1291 put an end to the kingdom founded by the Crusaders.—BIBLIOGRAPHY: Villehardouin and De Joinville, *Chronicles of the Crusades* (Everyman's Library); W. B. Stevenson, *The Crusaders in the East*; E. M. W. Buxton, *The Story of the Crusades*.

Crustacea, one of the classes into which the sub-kingdom of *arthropoda* (jointed-limbed invertebrates) is divided. The body consists of head, thorax, and abdomen, of which the two former are united into a single mass, cephalo-thorax, covered with a shield or carapace, and the abdomen usually presents the appearance of a tail. In some—the sand-hopper, woodlouse, &c.—the head is partially distinct from the thorax. The Crustacea breathe by branchiæ or gills, or by membranous vesicles, or by the general surface; and the body is composed of a series of rings more or less distinct. They possess the faculty of reproducing lost parts in an eminent degree. The general grouping of the Crustacea is sometimes based upon the successive metamorphoses which the higher Crustaceans undergo before reaching the adult form. Thus the first stage of the lobster embryo is that of a minute object with three pairs of limbs, known as the Nauplius-form; in the second, or Zoëa-stage, the cephalo-thorax is provided with anterior, posterior, and lateral spines; the final form being reached by a series of moultings. But for practical purposes the Crustacea may be considered as ranging themselves under four sub-classes—the Cirripedia, the Entomostraca,

the Podophthalmia, and the Edriophthalmia. Of these, the Cirripedia are represented by the barnacles; the Entomostraca by the cyclops, daphnia, &c.; the Podophthalmia by the shrimps, prawns, lobsters, &c.; the Edriophthalmia by the fish-lice, wood-lice, beach-fleas, &c.

Crutched Friars, an order of friars established at Bologna in 1169, and so named from their adopting the cross as their special symbol. They came to England in the thirteenth century.

Cryolite, $\text{AlF}_3 \cdot 3\text{NaF}$, a pale greyish-white or yellowish-brown mineral, a native fluoride of aluminium and sodium, found in Greenland and in the Urals. It has been employed in the extraction of aluminium, and in the manufacture of a hard porcellaneous glass of great beauty.

Cryophorus, an instrument for showing the diminution of temperature in water by its own evaporation. Wollaston's cryophorus consists of two glass globes containing water free from air, and united by a glass tube. When one of the globes is immersed in a freezing mixture, the water in the other globe freezes.

Cryptogamous Plants, or **Cryptogamia**, in botany, the division embracing the lower classes of plants having no evident flowers. They are divided into Thallophytes, including Algae, Fungi, and some minor groups; Bryophytes, comprising liverworts and mosses; and Pteridophytes, or Vascular Cryptogams, comprising ferns, horse-tails, and club-mosses. The term is no longer an appropriate one, as the reproductive processes of the groups in question are now at least as well understood as those of flowering plants.

Cryptography, the art of writing in secret characters or cipher. The simplest method consists in choosing for every letter of the alphabet some sign, or another letter or group of letters. The names in the records of the Clan-na-Gael Society were written in a cipher formed by taking in each case the letter previous to that intended; and the cipher devised by Francis Bacon consisted in an alphabet formed by different arrangements of the letters *a* and *b* in groups of five. Even the more complex ciphers, however, present, as a rule, only temporary difficulty to an expert. The facts that the most frequently recurring letter in the English language is the letter *e*, that the most

common double vowels are *ea* and *ou*, and that *r*, *s*, and *t* are the most frequent terminal letters, are of no small assistance in forming a key to any given cryptogram. An example of the relative frequency of letters being used to solve a cryptogram is found in Poe's tale *The Gold Bug*.

On active service the principal ciphers employed were the Playfair cipher and the B.A.B. code. In the Playfair the letters of the text are enciphered in pairs, and one letter of a pair is represented in cipher by the same letter only when the other letter of the pair remains the same. The cipher cannot be read without knowing the key-word, which is changed from time to time. It is practically insoluble, but not easy to read quickly. The B.A.B. code consists of numbers; there is an alphabet of numbers, and a phrase-book containing phrases represented by numbers. A correction (either plus or minus) is made for the code from time to time, so that the number written down is different from that representing the desired phrase. It is impossible to decode this cipher without possessing the code-book and knowing the current correction.

Crystal and Crystallography. A crystal, in chemistry and mineralogy, is any body which, by mutual attraction of its particles, has assumed a more or less symmetrical form bounded by plane surfaces. As a rule, crystals are produced by separation from solution, by solidification of a body from the molten state, or by sublimation. The most marked feature of a crystal is its regularity of form, and crystals usually show some kind of symmetry, with respect either to a point, a plane, or an axis.

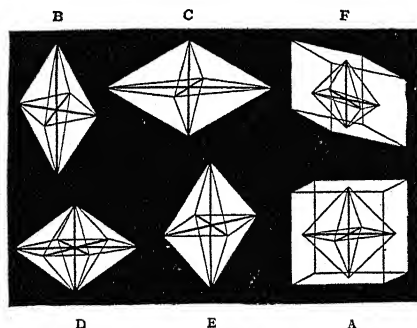
Crystallography, the description of crystals, was developed as a science by Romé de l'Isle and René Just Haüy in Paris between 1772 and 1822. Instruments (goniometers) had to be devised to measure the exact angles between crystal faces, and the foundations of the science were established on these measurements. The discovery of the more or less symmetrical disposition of the angular measurements led to the conception of *axes* intersecting in a central point within each form. Haüy made the most notable advance in the whole principles of crystallography when he discovered his 'law of rationality', and showed that, if we erect at our convenience three axes of reference within a

crystal of any given mineral species, and determine the relative distances from the point of intersection of these axes at which a plane (say a pyramid plane) cuts them, the distances or intercepts cut off by any other form of the same species bear to those first determined a simple numerical relationship expressible by means of whole numbers. Along two or more axes our typical pyramid plane may mark out distances that we may call unit intercepts, though these distances may differ among themselves; any other pyramid plane in the same species is found to cut these same axes so that the ratio between the new intercepts thus formed and the units

two of equal length, one longer or shorter than the other two, and all at right angles to one another. Substances crystallizing in this system are tinstone and copper pyrites. (3) *Rhombic or Orthorhombic System* (fig. C).—Crystals referred to 3 axes, all unequal and all at right angles to one another. Substances crystallizing in this system are potassium nitrate and magnesium sulphate. (4) *Hexagonal System* (fig. D).—Crystals referred to 4 axes of equal length, three in one plane intersecting at 120° , the fourth at right angles to the plane of the other three. Substances crystallizing in this system are ice, quartz, and calcspar. (5) *Monoclinic System* (fig. E).—Crystals referred to 3 axes of unequal length, two not at right angles, and the third at right angles to the plane of the other two. Substances crystallizing in this system are ferrous sulphate and gypsum. (6) *Triclinic System* (fig. F).—Crystals referred to 3 axes of unequal length, none of them at right angles. Substances crystallizing in this system are hydrated copper sulphate and manganese spar.

Crystal Structure.—Experimental researches based on the properties of X-rays have led within recent years to an immense advance in our knowledge of the arrangement of the atoms within a crystal. The idea originated with the German physicist Laue in 1912, but the chief results have been obtained by Sir W. H. Bragg and his son, W. L. Bragg. X-rays are made to fall on the crystal, and the spacing of the atoms is deduced from the character of the reflected rays by a method somewhat similar to that by which the wave-lengths present in a beam of light are sorted out by means of a diffraction grating (see *Dispersion; Spectrum*). The experimental results show that in such a crystal as sodium chloride the unit of structure is not the molecule but the atom. The sodium atom and the chlorine atom are ionized (see *Ionization*), and each has its own definite position in the internal pattern, or space lattice, every sodium atom being surrounded by six equidistant chlorine atoms, and every chlorine atom by six equidistant sodium atoms.—*BIBLIOGRAPHY:* A. E. H. Tutton, *Crystallography and Practical Crystal Measurement*; Sir W. H. and W. L. Bragg, *X-rays and Crystal Structure*.

Crystalline Rocks. This term is reserved for rocks in which crystals or



Crystallographic Systems

A, Cubic. B, Tetragonal. C, Rhombic.
D, Hexagonal. E, Monoclinic. F, Triclinic.

gives figures that are rational. It has been now shown that thirty-two classes of crystals with varying degrees of symmetry may occur within the limitations imposed by the law of rationality. Almost all these are already known to be realized in natural forms. These classes are assigned to the six old-established systems, given below; but seven systems are now very generally recognized, owing to the division of the hexagonal system into two, the hexagonal and the trigonal. The names for the six systems are: (1) *Cubic or Regular System* (fig. A).—Crystals of this system can be referred to 3 axes of equal length, all at right angles to one another. In its simplest form this system is represented by the cube. Many substances crystallize in this system, such as common salt, fluor-spar, and the alums. (2) *Tetragonal System* (fig. B).—Crystals are referred to 3 axes,

crystalline granules or patches have developed as the result of cooling from a molten state, or of processes of reconstruction under heating or pressure in the earth. Granites, dolerites, &c., are included under this heading.

Crystal Palace, the building erected in 1854 at Sydenham, near London, from the materials, and in part after the design, of the Great Exhibition building of 1851, and originally designed as a great educational museum of art, natural history, and ethnology. It is composed entirely of glass and iron, and consists of a long and lofty nave intersected at regular distances by three transepts, of which the central is 384 feet long, 120 feet wide, and 168 feet interior height. The building was secured for the nation in Dec., 1913, thanks to the efforts and liberality of the Earl of Plymouth.

Csongrad, a market town, Hungary, at the junction of the Körös with the Theiss. It trades in cattle, cereals, and wines. Pop. 25,000.

Ctenophora, or **Comb-jellies**, a class of marine animals belonging to the sub-kingdom Cœlenterata, definable as transparent, oceanic, gelatinous Actinozoa, swimming by means of *ctenophores*, or parallel rows of cilia disposed in comb-like plates.

Ctesiphon, an ancient city of Mesopotamia, on the Tigris, 25 miles south-east of Baghdad. In ancient times it was the capital of the Parthian kingdom. In A.D. 637 it fell into the hands of the Arabs, who devastated it, and used its ruins to furnish material for Baghdad.

Cuba, the largest and most westerly of the West Indian Islands, lying at the entrance to the Gulf of Mexico, about 150 miles from Florida and Yucatan. Its length is 750 miles; breadth, 20 to over 120 miles; area, 44,164 sq. miles. Since the Spanish-American War of 1898 Cuba has been independent, and is now under its own Republican Government. The chief commercial ports and harbours are: on the north, Havana (the capital), Matanzas, Cardenas, Sagua, and Remedios; on the south, Santiago, Trinidad, Cienfuegos, and Guantanamo. The surface exhibits various chains of hills extending from west to east, and in the extreme south-east is a mountain range rising to the height of over 8000 feet. At the foot of the hills the country opens

into extensive savannas. A considerable number of small streams water the island on both sides. Cuba is rich in minerals; those worked are chiefly copper and iron. Bitumen is plentiful, both in a liquid form and in a soft resinous state. There are many mineral springs, and on the north coast are extensive lagoons, which in dry years produce immense quantities of marine salt. The climate is hot and dry during the greater part of the year, though rain often descends in torrents from July to September. The soil is fertile and the vegetation is exceedingly luxuriant. Forests of mahogany, ebony, cedar, fustic, and other useful woods abound. The principal cereal cultivated is the indigenous maize. Rice is also produced in many districts; but the principal crops are sugar and tobacco, with a little cotton, cocoa, coffee, and indigo. A considerable extent of country is appropriated also to cattle-breeding farms, and to farms on which fruit and vegetables are raised. The principal fruits are the pineapple, oranges, shaddocks, plantains, bananas, melons, lemons, and sweet limes. The shores abound with turtle, and in the deep gulfs and bays the alligator is found. The manufactures are confined to the making of sugar, rum, molasses, and cigars, and these, with tobacco, form the chief exports. Next in commercial importance rank mahogany and other valuable timber and fruit. The great bulk of the trade is with the United States. There is also a considerable trade between Cuba and Great Britain. The exports in 1928 were £57,244,584, the imports £43,748,276. The money, weights, and measures of Cuba are as in Spain. Internal traffic has been greatly furthered by road improvements and by railways, the length of which (including plantation lines) is 3020 miles. Education is free and compulsory, and there is a university at Havana (founded 1721). Cuba was first discovered in 1492 by Columbus. In 1511 the Spaniards formed the first settlement on the island, and the natives were soon extirpated. Negro slaves were introduced in 1524. Slavery came to an end in 1886. In 1895 began an insurrection which led to the interference of the United States and the independence of Cuba. The pop. in 1928 was 3,579,507, over 25·7 per cent being coloured.—**BIBLIOGRAPHY:** G. C. Musgrave, *Cuba*:

the *Land of Opportunity*; I. A. Wright, *The Early History of Cuba*; A. J. Robinson, *Cuba: Old and New*.

Cubebs, the dried unripe fruit of *Cubeba officinalis*, or *Piper Cubeba*, a native of Java and other East India isles, order Piperaceæ. They are used medicinally.

Cubism is the term now in general use to describe an important movement in modern art, originally applied in derision by the French painter Matusse. The movement originated in France, the first Cubist painting being exhibited in 1908, since when it has taken firm hold in England, Germany, and the United States. It is in part a reaction against Impressionism (q.v.). Cubism aims at conveying in pictorial shape, not reality as seen by the eye, but its effect upon the mind and emotions of the artist. It has been largely inspired by Cézanne, who sought to express the underlying reality and rhythm of nature by the ordered arrangement of three dimensional forms. He relied entirely upon natural forms, but many Cubist (and other) painters use abstract and arbitrary forms, so that their work becomes a kind of visual music. In the later work of Pablo Picasso, the most important Cubist painter, this tendency to disregard natural form altogether is well seen, and it has been pushed to its furthest point in the 'colour harmonies' of the French 'Orphists'. Prominent Cubist painters in France besides Picasso are Georges Braque, Albert Gleizes, and Jean Metzinger. Derain, L'Hôte, and Marchand show similar tendencies, but are less extreme. English artists influenced by Cubist ideas include Roger Fry, Duncan Grant, and Wyndham Lewis. Cubism must be distinguished from Futurism (q.v.).—**BIBLIOGRAPHY:** W. H. Wright, *Modern Painting*; Albert Gleizes and Jean Metzinger, *Cubism*.

Cuckoo (genus *Cuculus*), a type of the family Cuculidæ, in which the first and fourth toes are turned backwards, as in the parrots. The note from which it derives its name is a love-call used only in the mating season. The species best known in Europe, the *Cuculus canorus*, is a bird about the size of a small pigeon, though the length of the tail gives it at a little distance a strong resemblance to a hawk. The adult bird is ashy-grey, with a white breast barred across with narrow

lines of greyish-black; tail spotted and barred with white; bill black, touched at the gape with yellow; eyes and feet yellow. It appears in England about the middle of April (rarely in March), and in May begins to deposit its eggs in the nests of other species, giving the preference to those of the hedge-sparrow, meadow-pipit, or pied wagtail. The young cuckoo ejects from the nest its young companions, and monopolizes the attentions of its foster-parents, which feed it for about five weeks after it is fledged. The young birds do not leave the country until the end of August or even September; but the adult birds commence their flight southward in July or at latest early in August. Their food consists largely of caterpillars (especially hairy ones), with cockchafer, moths, dragon-flies, and other insects. The female lays six or eight eggs, and each is placed in a different nest, by means of the bird's bill, as has been ascertained, the egg being first deposited on the ground.

Cuckoo-flower, or **Lady's-smock** (*Cardamine pratensis*), a common and pretty meadow plant, order Cruciferae, with pale-lilac or white flowers. It is abundant in Britain. The name is given to many flowers.

Cuckoo-pint, the *Arum maculatum*, popularly known also by the names of 'lords-and-ladies' and 'common wake-robin'.

Cucumber, the fruit of *Cucumis sativus*, or the plant itself, belonging to the Cucurbitaceæ or gourd order. It is an annual with rough trailing stems, large angular leaves, and yellow male and female flowers set in the axils of the leaf-stalks. Other species of the cucumber genus are *Cucumis Melo*, the common melon, and the water melon, *C. Citrullus*.

Cucurbitaceæ, the gourd order, consisting of large herbaceous plants, annual or perennial, with alternate leaves palmately veined and scabrous, and unisexual flowers. The order contains at least fifty-six genera and about three hundred known species, and includes the melon, gourd, cucumber, colocynth, and bryony. They are natives of both hemispheres, chiefly within the tropics.

Cucuta, an inland town in Colombia, department of Santander Norte. It is an important commercial place, and is the centre of a coffee and cacao district. Pop. (1928), 50,324.

Cuddalore, a maritime town in India, Presidency of Madras and district of South Arcot. It carries on a large land trade with Madras in indigo, oils, and sugar. It also exports grain and rice. The harbour is shallow, but there is a good roadstead. Pop. 50,527.

Cuddapah, a district and town, India, Presidency of Madras. The district (area, 8722 sq. miles) is traversed by the Eastern Ghats, and watered by the Pennar and its affluents. The forests contain much valuable timber, and the minerals include iron ore, lead, copper, and diamonds. Agriculture is in a flourishing condition, grain, cotton, and indigo being largely grown. Pop. 1,300,000.—The town exports indigo and cotton. Pop. 17,370.

Cudworth, Ralph (1617–1688), English divine and philosopher. In 1678 he published his *True Intellectual System of the Universe*. His *Treatise Concerning Eternal and Immutable Morality* was published posthumously (1731).

Cuenca, a city of Spain, in New Castile, capital of Cuenca province. Pop. 11,721.—Area of the province, 6636 sq. miles; pop. 285,583.

Cuenca, a town of Ecuador, next in importance to Quito and Guayaquil. Pop. 30,000.

Cuernavaca, a town of Mexico, capital of the state of Morelos. It has a school of agriculture, and manufactures sugar. Pop. 12,780.

Cujas, Jacques, or Cujacius (1520–1590), French jurist. He owed his reputation to the light shed by him on Roman law. He was the founder of the historical school of jurisprudence.

Culdees, an ascetic religious body or order, more especially associated with the Celtic branch of the Catholic Church in Scotland from the eighth to the thirteenth centuries, communities of Culdees being mentioned as living at various places, including St. Andrews, Glasgow, Iona, Dunkeld, Abernethy, Loch Leven, and Monymusk; while they were also known in Ireland, and are mentioned as existing in the north of England. Formerly very erroneous ideas prevailed regarding them, some holding that they were the earliest teachers of Christianity in Scotland, that their teaching was free from some of the doctrines most characteristic of the Roman Church, and that the ecclesiastical system established by them closely resembled the

Presbyterian. The Culdees no doubt had some distinctive peculiarities, but not so great as to prevent them from becoming amalgamated with the Roman Church in its fully developed condition in Scotland. Though living in communities devoted to religion and in a manner somewhat similar to monks, they did not belong to any of the monastic orders, might possess private property of their own, and might even be married. Andrew Lang, in his *History of Scotland*, compares them to married fellows of an English college.—BIBLIOGRAPHY: W. Reeves, *The Culdees of the British Islands*; W. F. Skene, *Celtic Scotland*.

Culebra Cut, Panama Canal, now known as *Gaillard Cut* (q.v.).

Culiacan, a city of Mexico, capital of the state of Sinaloa. Pop. 14,000.

Cullen, William (1710–1790), Scottish physician and medical writer. In 1756 he was elected to the chemical professorship in the University of Edinburgh. In 1773 he was appointed to the chair of the practice of physic. His principal works are: *A Treatise of Materia Medica*, *Synopsis Nosologiae Methodicae*, *Clinical Lectures*, and *First Lines of the Practice of Physic*.

Cullen, a seaport of Scotland, county of Banff; chief occupation, fishing. Pop. (1931), 1688.

Cullera, a town, Spain, province of Valencia. It exports oranges, wine, and oil. Pop. 13,556.

Culloden Moor, a heath in Scotland, 4 miles east of Inverness, where in 1746 the Duke of Cumberland defeated Prince Charles Edward Stewart. The battle was the last fought on British soil, and ended the attempts of the Stewarts to recover the throne of England.

Culross, a royal burgh, Scotland, Fife, on the Forth. Pop. (1931), 495.

Cumæ, a very ancient city of Italy, in Campania, the oldest colony of the Greeks in Italy, founded about 1030 B.C. by colonists from Chalcis, in Euboea, and from Cyne, in Asia Minor. It was destroyed A.D. 1207, and only a few ruins now exist.

Cumana, a town of Venezuela, capital of the state of Sucre. It is the oldest European city in the New World, having been founded in 1523. It has a good roadstead in Cumana Bay, with a trade in cacao, sugar, and tobacco. There is a large cotton-mill. Pop. (1926), 18,737.

Cumberland, Richard (1732–1811), English dramatic and miscellaneous writer. After one or two failures in writing for the stage, his *West Indian*, brought out by Garrick in 1771, proved eminently successful, and it was followed by the less popular *Fashionable Lover*, *The Cholerick Man*, *The Note of Hand*, and *The Battle of Hastings*. His subsequent works include his *Anecdotes of Spanish Painters* and the *Memoirs* of his own life.

Cumberland, William Augustus, Duke of (1721–1765), second son of George II of England. He rose in reputation by somewhat brutally subduing the second Jacobite Rebellion. In 1747 Cumberland was defeated by Marshal Saxe at Lauffeld, and in 1757 he lost the battle of Hastenbeck against D'Estrées, and concluded the Convention at Klosterzeven, by which 40,000 English soldiers were disarmed and disbanded, and Hanover placed at the mercy of the French. He then retired in disgrace from his public offices, and took no active part in affairs.

Cumberland, the extreme north-western county of England. The area is 973,086 acres, rather more than a half of which is under cultivation. Two ranges of lofty mountains may be traced—one towards the north, to which belongs the ridge called Crossfell (2892 feet); and the other to the south-west, of which the highest peak is Skiddaw (3058 feet). Other important summits are: Scaw Fell Pike (3210 feet), Scaw Fell (3162 feet), Helvellyn (3118 feet), and Bow Fell (2960 feet). The two largest rivers are the Eden and the Derwent. The county embraces part of the 'Lake Country' of England. The largest lakes are Derwentwater, Buttermere, Thirlmere, and part of Ullswater. Cumberland is rich in minerals, including lead, gypsum, zinc, and especially coal and rich hematite iron ore. In the western division of the county there are a great many works for the manufacture of steel and iron. The principal crops raised are oats, barley, wheat, and turnips, but the bulk of the enclosed lands is sown in clover and grass. The rearing of cattle and sheep and dairy-farming are engaged in to a considerable extent. Carlisle is the county town; other towns are the seaports Whitehaven, Workington, and Maryport; and the inland towns Penrith, Cockermouth, and Keswick. Pop. (1931), 262,897.

—Cf. *Cumberland* (Victoria County History).

Cumberland, a city of Maryland, U.S.A., on the Potomac. It is a canal and railway terminus. It is on the edge of the great coal-basin of the same name, and iron is also largely worked in the vicinity. Pop. 29,837.

Cumberland, a river of the U.S.A. which runs through Kentucky and Tennessee into the Ohio, having a course of about 600 miles, navigable for nearly 200 miles.

Cumberland, a port, Vancouver Island, with coal-fields in the vicinity. Daily export of coal exceeds 3500 tons. Pop. 3176.

Cumbrae, Great and Little, two Scottish islands in the Firth of Clyde, belonging to the county of Bute. The Great Cumbrae is $3\frac{1}{2}$ miles in length and 2 miles in breadth; area, 3120 $\frac{1}{2}$ acres. The only town upon it is Millport, a seaside resort. The Little Cumbrae is $1\frac{1}{2}$ miles in length by a mile in breadth; area, 700 acres. Pop. of Cumbraes (1931), 2165.

Cumbria, an ancient British principality, comprising part of Cumberland and the Scottish districts Galloway, Kyle, Carrick, Cunningham, and Strathclyde, its capital being Alcluyd or Dumbarton. In the sixth century it was an important and powerful kingdom, but early in the eleventh century it became a fief of the Crown of England.

Cumbrian Mountains, a range of hills, England, occupying part of the counties of Cumberland, Westmorland, and North Lancashire.

Cumin, or **Cummin**, an umbelliferous plant found in Mediterranean countries. The fruit possesses stimulating and carminative properties, and is used in veterinary science.

Cumnock, Old, a burgh of Scotland, Ayrshire, on the Lugar, with collieries, quarries, and manufactures of woollen goods. Pop. (1931), 3653.—*New Cumnock* lies 5 miles to the south-east, in the same mineral district. Pop. 1889.

Cumulative Vote, the system by which every voter is entitled to as many votes as there are persons to be elected, and may give them all to one candidate, or may distribute them among the candidates, as he thinks fit. The principle was first introduced into Britain by the Elementary Education Act of 1870, but it was not recognized in any elections save those of the school boards. In Scotland it has

been superseded by the principle of proportional representation in the election of the education authorities (Education Act of 1918).

Cundinamarca, one of the departments of the Republic of Colombia. It is well wooded, rich in minerals, and produces good coffee. The capital is Bogota. Area, 8046 sq. miles; pop. (1928), 1,570,356.

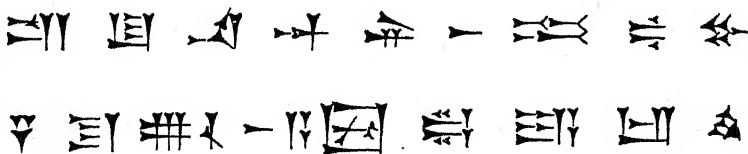
Cuneiform Writing, the wedge-shaped characters of the inscriptions on old Sumerian, Babylonian, Assyrian, and Persian texts. They appear to have been invented by the primitive Sumerian inhabitants of Lower Mesopotamia. They were borrowed with considerable modification by the intruding Akkadians, Babylonians, and Assyrians, who were Semites by race and spoke different languages. The first hints towards decipherment were

of silk and woollens. Pop. 36,419.—The province has an area of 2870 sq. miles, and a population of (1928) 639,677.

Cunliffe-Lister, Sir Philip (1884—), British politician, known until 1924 as Lloyd-Greame. He was President of the Board of Trade from 1922 to 1923, and from Nov., 1924, to June, 1929.

Cunningham, Allan (1784–1842), Scottish poet and man of letters. His works comprise the drama *Sir Marmaduke Maxwell*; the novels *Paul Jones*, *Sir Michael Scott*, and *Lord Roldan*; *Songs of Scotland*; *Lives of the most Eminent British Painters, Sculptors, and Architects* (1829); and *The Works of Burns*, with notes and a life.

Cupar, or **Cupar-Fife**, a burgh of Scotland, county town of Fifeshire, on the River Eden, 10 miles west of St. Andrews. Pop. (1931), 4596.



Babylonian Cuneiform Inscription, about 2500 B.C.

The translation reads: "She placed me in a basket-boat of rushes, and with pitch closed the door."

given by Karstens Niebuhr late in the eighteenth century; and the labours of Grotefend, Rask, Burnouf, Lassen, Rawlinson, Smith, and other investigators slowly perfected the means of translation. Most of the inscriptions first discovered were in three different languages and as many varieties of cuneiform writing. The most celebrated trilingual inscription is that at Behistun, cut upon the face of a rock 1700 feet high, and recording a portion of the history of Darius.—**BIBLIOGRAPHY**: D. Schrader, *Cuneiform Inscriptions and the Old Testament*; G. A. Barton, *The Origin and Development of Babylonian Writing*.

Cunene, a river of South Africa, which enters the Atlantic after forming the boundary between Angola and South-West Africa.

Cuneo, a town of North Italy, capital of the province of Cuneo, situated at the confluence of the Stura and the Gesso, 47 miles south of Turin. It has manufactures

Cupar-Angus, a market town in Perthshire, Scotland. Pop. (1931), 1883.

Cupellation, the extracting, refining, assaying, or 'parting' of noble metals, e.g. gold or silver, &c., from some less valuable admixture, generally lead. The baser metals are oxidized by means of a hot forced draught, and the oxides sink into the *cupel*, or shallow porous cup, of bone-ash or calcium phosphate, leaving the noble metal usually in the form of a globule or 'button'.

Cupid, the god of love; corresponding to the Greek Erös. He is represented as a winged boy, naked, armed with a bow and a quiver full of arrows. Cupid or Erös was a favourite subject for genre painters of the degenerate Alexandrian school. The poems long falsely attributed to Anacreon, and many poems of the Anthology, recount the adventures and misadventures of Cupid. The beautiful story of Cupid and Psyche was first told by Apuleius in his *Golden Ass*.

Curaçao, an island, Dutch West Indies, Caribbean Sea; area, 210 sq. miles; capital, Willemstad; principal harbour, Santa Anna. It is hilly, wild, and barren, with a hot, dry climate. Yellow fever visits it every sixth or seventh year. Fresh water is scarce, and serious droughts occur. The tamarind, coco-palm, banana, and other useful trees are reared—among them three varieties of orange, from one of which the Curaçao liqueur is made. Sugar, tobacco, cochineal, and maize are also produced, but the staple exports are salt and a valuable phosphate of lime. The islands of Curaçao, Bonaire, Oruba, part of St. Martin, St. Eustache, and Saba form the colony of Curaçao (area, 403 sq. miles), which is a Dutch government, the residence of the Governor being at Willemstad. Pop. of the island, 33,232; of the colony, 54,963.

Curare, a highly poisonous alkaloidal extract from the bark of *Strychnos toxifera* and related species, used as an arrow-poison by the Amazonian tribes. It is a brown or black brittle solid, and its composition varies with its source. It has both a paralysing and tetanizing action, the painful death by suffocation being probably due to paralysis of the muscles of the chest. Medicinally it is used in tetanus, strychnine poisoning, and hydrophobia.

Curassow, or **Hocco**, the name given to gallinaceous birds of the genus *Crax*, family Cracidae; natives of the warm parts of America.

Curator, in civil law, the guardian of a minor who has attained the age of fourteen if a male, twelve if a female, of persons under various disabilities, or of the estate of deceased or absent persons and insolvents. Curators are deputed mainly and sometimes solely for temporal concerns and only incidentally as guardians of persons.

Curepipe, the second largest town of Mauritius, situated in the interior, and connected by rail with Port Louis. Pop. 17,173.

Curfew, a practice originated in England by William the Conqueror, who directed that at the ringing of the bell at eight o'clock all fires and lights should be extinguished. The law was repealed by Henry I in 1100, but the bell continued to be rung in many districts until quite modern times.

Curico, a town of Chile, capital of pro-

vince of same name. Pop. 15,879.—Area of province, 3045 sq. miles; pop. 108,148.

Curie, Pierre (1859–1906), French physicist and chemist. His name is chiefly known in connexion with the discovery of radium, in which his wife, Marie Skłodowska (1867–), was associated with him. In 1903 they received the Davy medal of the Royal Society, and part of the Nobel prize. In 1911 Mme Curie received the Nobel prize for chemistry. In 1921 the women of the United States made her a gift of a gramme of radium.

Curitiba, a town of Southern Brazil, capital of the state of Paraná, connected by railway with the port of Paranaguá. Pop. 24,000.

Curlew, a very widely distributed genus of birds, belonging to the same family (Charadriidae) as plovers, snipe, and woodcock. The genus is characterized by a very long, slender, and arcuated bill, tall and partly naked legs, and a short, somewhat rounded tail. Two species of curlew inhabit the British Isles, the curlew proper, called in Scotland the 'whaup' (*Numenius arquata*), and the whimbrel (*N. phaeopus*). They are similar in appearance and in habits, only the latter is rather smaller than the former. Three species of curlew are inhabitants of America.

Curling, a winter sport which is said to have originated in the Netherlands, but has been known and popular in Scotland for at least three centuries. It is played with large circular, partly flattened *curling-stones* of highly polished whinstone or granite, shaped somewhat like a Gouda cheese, weighing between 35 and 50 lb., and furnished with a handle on the upper side, by means of which they can be grasped and slid along the *rink*. This *rink* is a stretch of ice varying in length from 30 to 50 yards. At each end of the rink is a mark or hole called the *tee*. The object of each player is to lay his stone as near the tee as possible, to guard such stones of his own side as have already been well laid, or to displace well-laid stones of the opposing side. When the stones on both sides have all been played, the stone lying nearest the tee counts one, and if the second, third, fourth, &c., belong to the same side, each counts one more. 'Game' is usually twenty-one, or sometimes thirty-one.—**BIBLIOGRAPHY:** J. Taylor, *Curling*; J. G. Grant, *The Complete Curler*.

Curran, John Philpot (1750–1817), Irish advocate and politician. His eloquence, wit, and ability soon made him the most popular advocate of his age and country. In 1806 he was appointed to the office of Master of the Rolls, which he held till 1814.

Currant, (1) a small kind of dried grape imported from the Levant. The plant is delicate and the crop precarious, and its cultivation requires a great outlay of capital. (2) The name of some well-known shrubs, order Grossulariaceæ, cultivated in gardens for their fruit: the red currant, *Ribes rubrum*, a native of Southern Europe, Asia, and Northern America; the white currant, a cultivated variety of the red, and used chiefly for dessert and for conversion into wine; the black currant, *R. nigrum*. Other currants naturalized in Britain are the ornamental *Ribes aureum* from Western America, which produces a fine berry, and *R. sanguineum*, the flowering currant, which is insipid but non-poisonous.

Currents, Marine. See *Geography*.

Currie, James (1756–1805), the biographer of Burns and earliest editor of his works. Having made an excursion into Scotland in 1792, he had become personally acquainted with Robert Burns, and upon the death of the poet he was induced to become the editor of his works, to which he added a *Life*. By this work, long regarded as the standard edition, a sum of £1400 was raised for Burns's wife and her family.

Curtius, Ernst (1814–1896), German Hellenist. Of his works, which all relate to Greek antiquities, the best known is his *History of Greece*; English translation by Sir A. W. Ward.

Curtius, Georg (1820–1885), German philologist, brother of the preceding. Of his works a *Greek Grammar*, *Principles of Greek Etymology*, and *The Greek Verb* have been translated into English.

Curtius, Mettius or Marcus, a noble Roman who, according to the legend, plunged with horse and armour into a chasm which had opened in the forum (362 B.C.), thus devoting himself to death for the good of his country, a soothsayer having declared that the dangerous chasm would only close if what was most precious to Rome was thrown into it.

Curtius Rufus, Quintus, a Roman writer, author of *De rebus gestis Alexandri*

Magni (History of Alexander the Great), in 10 books, the two first of which are lost. His style is florid, and his narratives have more of romance than of historical certainty.

Curve and Curvature. A *curve* is the locus, or assemblage of positions, of a point which moves in such a way as always to fulfil a given condition. The expression of this condition in terms of the co-ordinates of the moving point leads to an equation which is called the *equation of the curve*. The *curvature* at a point of a curve is the rate of change of direction of the tangent per unit length of arc. The *circle of curvature* at the point is the circle which touches the curve there, and has the same curvature. The radius of the circle of curvature is called the *radius of curvature*. A curve which does not lie in one plane is said to be *twisted*, or to have *double curvature*.

Curwen, John (1816–1880), English musician, the chief promoter of the tonic sol-fa method of teaching to sing. He entered the ministry of the Independent Church, and became acquainted with Miss Glover's sol-fa system while visiting that lady's schools at Norwich. After that he devoted much of his time to bringing the new method before the public.

Curzola, the most beautiful of the Dalmatian islands, in the Adriatic; area, 85 sq. miles. It is covered in many places with magnificent timber. The fisheries are productive. The island has belonged to Yugoslavia since 1918. Pop. 18,920.

Curzon of Kedleston, George Nathaniel Curzon, first Marquess (1859–1925), British politician, administrator, and traveller. He became assistant private secretary to the Marquess of Salisbury in 1885, and from 1886 to 1898 was member of Parliament for the Southport division of Lancashire. He was Under Secretary for India and for Foreign Affairs; and from 1898 to 1905 was Viceroy of India. In 1915 Lord Curzon joined the Coalition ministry, was Lord Privy Seal from 1915 to 1916, President of the Air Board in 1916, Lord President of the Council 1916 to 1919, and was Secretary of State for Foreign Affairs from 1919 to 1923. In Nov., 1924, he became Lord President of the Council and Leader of the House of Lords. He wrote: *Russia in Central Asia and the Anglo-Russian Question*; *Persia and the Persian Question*; *Problems of the Far*

East: Japan, Korea, China; Modern Parliamentary Eloquence; Subjects of the Day, and British Government in India.

Cusa, Nikolaus of, or Nikolaus Cusanus (1401-1464), Roman Catholic philosopher and theologian. He taught that God cannot be apprehended by intellect, but by intuition. He was the first to teach the revolution of the earth about the sun and the plurality of worlds.

Custard-apple (*Anōna reticulāta*), a fruit, a native of the West Indies, but cultivated in most tropical countries.

Customary Law is that part of the common law which has its origin in local custom (see *Common Law*). Custom is "a reasonable act iterated, multiplied, and continued by the people from time whereof memory runs not". To obtain recognition a custom must be certain; reasonable—not opposed to the public weal or prejudicial to the many or beneficial only to one or based upon wrong; ancient—practised from time immemorial or at least well established; not optional in observance; continuously exercised as of right and universally acquiesced in; not inconsistent with another custom of the same place nor with legal principles. In any conflict statute law is superior to custom, but through the force of contrary custom a Scots statute might fall into desuetude. There is no parallel to this in England.—Cf. Pollock and Maitland, *History of English Law*.

Customs, duties charged upon imported goods. In the United Kingdom the principal dutiable articles are tobacco, tea, spirits, sugar, and wine, and the annual revenue from customs is well over £110,000,000 (£119,329,000 in 1929). In 1932 and 1933 customs receipts greatly increased owing to the general imposition of tariffs. The large staff of customs officials which is scattered throughout the ports of Great Britain is controlled by the Board of Customs and Excise. In many countries exports are also liable to be taxed.

Custos Rotulorum, the chief civil officer or Lord-Lieutenant of an English county, who has the custody of the rolls and records of the sessions of the peace. He is usually a nobleman, and always a justice of the peace of the quorum in the county where he is appointed. The office was formerly filled by appointment of the Lord Chancellor, but it has been

conferred by the Crown for over 300 years.

Cutch, a state in the west of India, lying to the south of Sind, under British protection; area, 7616 sq. miles. During the rainy season it is wholly insulated by water, the vast salt morass of the Runn separating it on the north and east from Sind and the Gaekwar's Dominions. Its southern side is formed by the Gulf of Cutch, and on the west it has the Arabian Sea. The country is subject to violent volcanic action. The date is the only fruit which thrives, and the principal exports are cotton and horses. The Runn of Cutch covers about 9000 sq. miles, and is dry during the greater part of the year. Pop. of state, 484,547.

Cuthbert, St. (d. 687), Father of the early English Church. He became a monk, and in 664 was appointed prior of Melrose, which after some years he quitted to take a similar charge in the monastery of Lindisfarne. Still seeking a more ascetic life, Cuthbert then retired to the desolate isle of Farne, where he died.—Cf. C. Eyre, *The History of St. Cuthbert*.

Cutlery is a term applied to all cutting instruments made of steel. The finer articles, such as the best scissors, pen-knives, razors, and lancets, are made of cast steel. Table-knives, plane-irons, and chisels of a very superior kind are made of shear steel, while common steel is wrought up into ordinary cutlery.—Cf. G. T. H. Lloyd, *The Cutlery Trades*.

Cuttack, a town of India, in Orissa. It has little trade, and is known mainly for its beautiful filigree work in gold and silver. Pop. 51,007.—The district of Cuttack has an area of 3654 sq. miles. It is well watered, and rice, pulse, sugar, spices, dye-stuffs, &c., are grown along the coast, which is low and marshy, and wheat and maize in the hilly regions. On the coast salt is extensively manufactured. Pop. 2,059,000.

Cuttle-fish. See *Cephalopoda*; *Squid*; and *Sepia*.

Cuvier, Georges Léopold Chrétien Frédéric Dagobert, Baron (1769-1832), French naturalist. Amongst the numerous works by which he greatly extended the study of natural history we may mention: *Recherches sur les Ossements Fossiles*; *Discours sur les Révolutions de la Surface du Globe*; *Leçons d'Anatomie Comparée*; *Histoire Naturelle des Poissons*; and *Le Règne Animal*, a general view of the

animal kingdom, in which all animals were divided into the four great classes Vertebrata, Mollusca, Articulata, and Radiata.—Cf. S. Lee, *Memoirs of Baron Cuvier*.

Cuxhaven, a German seaport, bathing-place, and pilot station in Hamburg territory, at the mouth of the River Elbe. The harbour (low-water depth, $26\frac{1}{2}$ feet) is large and commodious, and there are shipyards. Pop. about 14,890.

Cuyabá, a town of Brazil, capital of Matto Grosso, on the River Cuyabá. Pop. about 33,000. There are rich gold-mines in the district.

Cuzco, an ancient city in Peru, capital of a department of the same name, is situated in a wide valley about 11,300 feet above sea-level. The ruins of the fortress built by the Incas, a stupendous specimen of cyclopean architecture, are still to be seen. The inhabitants manufacture sugar, soap, cotton, and woollen goods. Pop. about 15,000.—Area of the department, 156,270 sq. miles; pop. 438,646 (no census since 1896).

Cyamus, a genus of Crustacea, the species of which are parasites on the whale. They are called *Whale-lice*.

Cyanamide, or **Calcium Cyanamide**, is produced by heating calcium carbide to 1000° C. in an atmosphere of nitrogen, or by heating a mixture of limestone and charcoal to 2000° C. in a current of air. This yields crude calcium cyanamide, which is used as a fertilizer in agriculture. The compound contains nitrogen, and is readily decomposed by water, yielding ammonia, which may be utilized by the plant.

Cyanides are compounds of the radicle cyanogen. Carbon and nitrogen combine indirectly to form cyanogen, C_2N_2 , and this group behaves as an element, entering unchanged into the composition of a large number of compounds.

The simplest derivative is hydrocyanic acid or prussic acid (q.v.), and the simple salts of this acid comprise the simple cyanides. In the presence of oxygen the soluble cyanides dissolve all ordinary metals except lead and platinum, and this property is utilized in extracting gold from its ores (see *Cyaniding*). Sodium and potassium cyanides are the most important. They are white crystalline solids which are very poisonous, and are used in electroplating with gold, silver, copper, nickel,

and tin, and in photographic work. The sodium compound is used to-day for gold extraction, the fumigation of fruit trees, and case hardening. Potassium cyanide is stable in dry air, but when fused oxidizes readily, and is a powerful reducing agent.

Sodium and potassium ferrocyanides are used for silk dyeing, for Prussian blue manufacture, and case hardening iron. *Prussian blue* is ferric ferrocyanide. It is now falling into disuse as a dye owing to the competition of the aniline colours and ultramarine, and also to its being fugitive to soap. Blue printing-paper is paper coated with a solution of ferric ammonium citrate or oxalate and potassium ferricyanide, and is exposed to light beneath a transparent drawing. The light reduces the salt to the ferrous state, and on washing in water a deposit of Prussian blue is obtained, and the unexposed portions emerge white. Alkali ferricyanides are used in pigment manufacture, in dyeing, and in printing. They are red compounds, the potassium compound being known as red prussiate of potash. *Turnbull's blue* is ferrous ferricyanide, $Fe_3Fe_2(CN)_{12}$, and is obtained by adding red prussiate solution to a ferrous salt solution. Prussian blue contains large quantities of Turnbull's blue.

Cyaniding is the process of extracting gold from its ores by means of sodium cyanide solution. The ore is broken and ground till it can pass a 150 to 200 mesh sieve. It is then washed with alkaline solution. One-third of the total weight of ore is now added as cyanide solution of about 0.1 per cent strength, which is followed by washings of weaker cyanide and of water. Argentiferous gold ore requires a stronger cyanide solution to extract its gold. The gold is now in solution as sodium aurocyanide, and is precipitated as a slime by thread-like turnings of zinc. The 'slimes' are worked up with suitable fluxes, or with sulphuric acid, or with lead, to recover the gold in a pure form. In practice about 14 oz. of sodium cyanide and 4 to 12 oz. of zinc are required per ounce of gold recovered. This method is only suitable where the particles of gold are very finely divided. It is much used in the Transvaal, Australia, New Zealand, India, and America, and provides 25 per cent of the entire world production of gold.

Cyanin, the blue colouring-matter of

certain flowers, as of the violet, corn-flower, &c.

Cyanogen, C_2N_2 , a colourless, exceedingly poisonous gas with an odour resembling that of peach kernels. It is found in small quantities in the gases from coke-ovens and blast-furnaces. See *Cyanides*.

Cyanophyceæ. See *Blue-green Algae*.

Cyanosis is blue discoloration of the skin due to imperfect oxidation of the blood. It is usually most marked in the face and extremities, but is seen all over the body surface in infants with congenital heart disease (blue babies). It is produced by interference with the normal respiratory action of the lungs, and is therefore frequently present in diseases of the heart and lungs. During acute attacks it is a sign of grave significance, but in chronic heart and lung conditions a considerable degree of cyanosis may be present when the patient is able to get about.

Cybele, originally a goddess of the Phrygians, the Great Mother Deity, and, like Isis, the symbol of the moon. From Asia Minor her cult spread to Thrace and the islands, and finally to Greece and to Rome. Her worship was celebrated with a violent noise of instruments and rambling through fields and woods, and her priests were eunuchs in memory of Attis (q.v.).

Cycadaceæ, or *Cycads*, a natural order of Gymnosperms, resembling palms in their general appearance.

Cyclades, the principal group of islands in the Grecian Archipelago, belonging to the Republic of Greece, so named from lying round the sacred island of Delos in a circle. The largest islands of the group are Andros, Paros, Myconos, Tenos, Naxos, Melos, and Thera or Santorin. They are of volcanic formation and generally mountainous. Some are very fertile, producing wine and olive-oil; others are almost barren. The inhabitants are excellent sailors. Pop. (1928), 129,702.

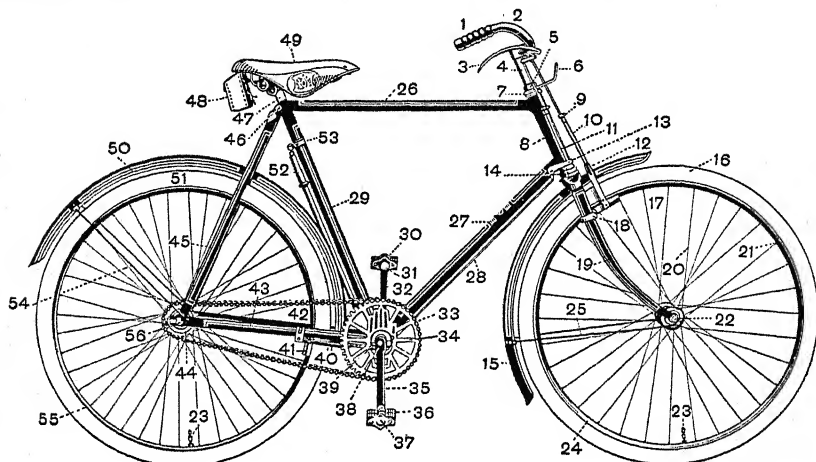
Cyclamen, a genus of plants, nat. ord. Primulaceæ. The species are low-growing herbaceous plants, with very handsome flowers. Several of them are favourite spring-flowering greenhouse plants.

Cycle and Cycling. A forerunner of the bicycle, dating from about 1817, had two wheels of nearly equal size, one placed before the other, connected by a beam on which the driver sat, and was propelled by the thrust of his feet upon the ground. About 1861 a superior machine was intro-

duced, and soon many forms became popular; but the derisive name of 'bone-shaker' was not undeserved. The machine, however, formed the basis of the various kinds of cycle which followed. The 'high' bicycle, with a very small rear wheel and a front wheel sometimes as much as 60 inches in diameter, was at the height of its popularity about the 'eighties'. It gradually gave place to various forms of the low 'safety' bicycle. Contemporary with the 'high' bicycle were many forms of tricycle, a machine which had a considerable vogue. The 'high' bicycles, as also the earlier 'safeties', were fitted with solid tyres of india-rubber, an improvement which reduced jolting to the rider and much wear and tear to the machine. These were succeeded by 'cushion' tyres, larger in size and with a hollow centre; which were in turn replaced by the present pneumatic tyres, hollow and of large diameter, which are pumped full of air and kept in that state while the cycle is in use. A still later innovation was the 'free wheel' now practically universal. This change called for increased brake-power, and the brake is now usually duplicated. The brakes may press on the tyres, on the rims of the wheels, or on the band, and are either applied by hand or by reversing the pedals. Bicycles are fitted with either single-, two-, or three-speed gears, the last two giving additional hill-climbing power. The speed attained by an expert on an ordinary modern bicycle is considerable, 1 mile having been covered in about $1\frac{1}{2}$ minutes—in much less in America on a special track, on which the rider was protected from the wind by a preceding train—10 miles in about $11\frac{1}{2}$ minutes, and 50 miles in about $55\frac{1}{2}$ minutes. Coming to longer distances, 100 miles have been covered in 2 hours 26 minutes, and 634 miles 774 yards in 24 hours (1899); while the 874 miles from Land's End to John o' Groats has been ridden in 3 days, 5 minutes, 49 seconds. A remarkable cycling feat was Mr. Thomas Stevens's journey of 12,000 miles across the continents of America, Asia, and Europe, commenced in April, 1884, at San Francisco. He reached Shanghai on the 18th Nov., 1886. A longer ride was performed by Mr. (now Sir) John Foster Fraser and two companions during 1896, 1897, and 1898, the three riders covering 19,237 miles in 774 days. The manufacture of cycles is a

very important industry, the chief English centres of the trade being Coventry, Birmingham, London, Nottingham, and Wolverhampton. Cycling clubs are numerous. The Cyclists' Touring Club (C.T.C.) and the National Cyclists' Union (N.C.U.) are

carriage, or any horse, mule, or other beast of burden, the rider must, by sounding a bell or otherwise, give audible and sufficient warning of his approach. Under the Road Transport Lighting Act (1928) all push bicycles must carry a white head-



The Parts of a Bicycle

- | | | |
|--|---|--|
| 1, Handle-grips. | 20, Spokes. | 38, Bottom bracket axle. |
| 2, Handle-bar. | 21, Spoke nipples. | 39, Crank cotter pin. |
| 3, Brake lever. | 22, Front hub, spindle, cones and nuts. | 40, Back brake stirrup. |
| 4, Handle-bar stem. | 23, Valves. | 41, Back brake block. |
| 5, Lock nut. | 24, Front rim. | 42, Back brake stay clip. |
| 6, Lamp bracket. | 25, Front mudguard stay. | 43, Chain stay. |
| 7, Steering lock. | 26, Frame top tube. | 44, Back chain wheel. |
| 8, Head tube. | 27, Frame bottom tube. | 45, Seat stay. |
| 9, Front brake adjusting bolt and nut. | 28, Back brake cable. | 46, Seat lug bolt. |
| 10, Front brake rod. | 29, Seat tube. | 47, Saddle pillar. |
| 11, Back brake rod. | 30, Left pedal. | 48, Tool bag. |
| 12, Front brake stirrup. | 31, Left pedal spindle. | 49, Saddle. |
| 13, Back brake bell crank. | 32, Left crank. | 50, Back mudguard. |
| 14, Fork crown. | 33, Chain. | 51, Back tyre. |
| 15, Front mudguard. | 34, Front chain wheel. | 52, Pump. |
| 16, Front tyre. | 35, Right crank. | 53, Pump clip. |
| 17, Front brake block. | 36, Right pedal. | 54, Back mudguard stay. |
| 18, Front brake fork clip. | 37, Right pedal spindle. | 55, Back wheel rim. |
| 19, Fork sides. | | 56, Back hub, spindle, cones and nuts. |

comprehensive bodies, the former having an international character. In Great Britain bicycles, tricycles, and similar machines are declared by law to be carriages within the meaning of the Act relating to roads and highways, and various special enactments are in force. Upon overtaking any foot-passenger or cart or

light, and either a red rear light or a red rear reflector, during the period between one hour after sunset and one hour before sunrise in Summer Time, and between half an hour after sunset and half an hour before sunrise in winter. As the regulations are strictly enforced cyclists are advised to study the Act.

Cycloid. The common cycloid is a curve generated by a point on the circumference of a circle when the circle rolls along a straight line. It is the curve of quickest descent from one point to another, and it is the curve along which a particle must vibrate under gravity, if its vibrations are to be absolutely isochronous, that is to say, if the period of vibration is to be independent of the extent of the swing. If a circle rolls externally upon another circle, a point on the circumference traces out an *epicycloid*; if internally, an *hypocycloid*. If the point be not on the circumference, the curves formed are called *trochoids*. These curves are important in the designing of the teeth of wheels for machinery.

Cyclone, a term originally applied to the violent storms which occur in the Bay of Bengal and other parts of the tropics, generally after an ominous calm

in different countries. In the United States it is 26 miles an hour, in Western Europe 16 miles an hour. The winter rate is about double the summer rate. The term anticyclone was first used by Sir Francis Galton to describe a condition of pressure and circulation just the reverse of the cyclonic condition. The business of weather forecasting is very much a matter of getting news of approaching depressions and anticyclones, and estimating their probable motion.—See *Meteorology*.

Cyclops, a fabled race of one-eyed giants, variously described in Greek mythology. In Homer they are gigantic cave-dwellers and cannibals. Later traditions describe them as the servants of Hephaestus (Vulcan) working under Ætna, and engaged in forging armour and thunderbolts.

Cyclostomi, lampreys and hags, which constitute the lowest order of fishes, while some authorities regard them as forming a distinct class, of lower rank than fishes.

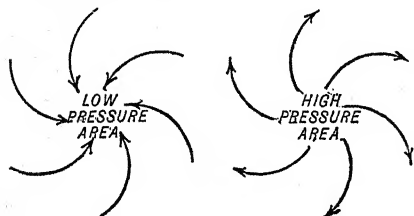
Cydnus, a river in Cilicia, rising in the Taurus Mountains, anciently celebrated for the clearness and coolness of its waters.

Cyllene, a mountain of Southern Greece, 7789 feet high. It is the fabled birth-place of Hermes.

Cyme. See *Inflorescence*.

Cymri, a branch of the Celtic family of nations which succeeded the Gaels in the great migration of the Celts westwards, and which drove the Gaelic branch to the west (into Ireland and the Isle of Man) and to the north (into the Highlands of Scotland), while they themselves occupied the southern parts of Britain. At a later period they were themselves driven out of the Lowlands of Britain by the invasions of the Angles, Saxons, and Jutes, and compelled to take refuge in the mountainous regions of Wales, Cornwall, and the north-west of England. Wales may now be regarded as the chief seat of the Cymri.

Cynewulf, an Anglo-Saxon or early English poet, whose name we only know from its being given in runes in the poems attributed to him, viz. *Elene* (Helena), the legend of the discovery of the true cross; *Juliana*, the story of the martyr of that name; and *Crist* (Christ), a long poem incomplete at the beginning. The poems are preserved in two MSS., the *Æteter Book* and the *Vercelli Book*, both of the



Direction of movement of the air in a cyclone in the Northern Hemisphere.

Direction of movement of the air in an anticyclone in the Northern Hemisphere.

and sudden drop of the barometer. The word is now used in a wider sense to denote a special kind of distribution of motion and pressure in the atmosphere. In a region where a cyclone exists, the pressure decreases from the outside inwards, so that the barometer is always low near the centre. The steeper the pressure gradient, the higher the wind velocity. The winds blow spirally inwards towards the centre, counter-clockwise in the northern hemisphere, and clockwise in the southern. Outside the tropics, a cyclone is usually called a depression, in allusion to the lowering of the barometric height. A depression is, as a rule, accompanied by much cloud and rain. Depressions move more quickly in winter than in summer, and deep depressions move more quickly than shallow ones. The average rate, moreover, varies much

eleventh century.—Cf. C. W. Kennedy, *The Poems of Cynewulf, translated into English*.

Cynics, a sect of philosophers among the ancient Greeks, founded by Antisthenes, a pupil of Socrates, at Athens about 380 B.C. They subordinated scientific inquiries to the attainment of virtue, which they made to consist in entire self-denial and independence of external circumstances. They preached a 'return to nature' as an escape from social convention with its ills. In time this attitude degenerated into a kind of philosophic savagery and neglect of decency, and the Cynics fell into contempt.

Cynipidæ. See *Gall-flies*.

Cynoscephalæ, a range of hills in Thessaly, memorable for two battles fought there in ancient times. The first was 364 B.C., between the Thebans and Alexander of Phæræ, in which Pelopidas was slain; and the second 197 B.C., in which the last Philip of Macedon was defeated by the Roman consul Flamininus.

Cyperaceæ, the sedges, a natural order of monocotyledonous plants, including fully 2000 known species. The members of this order are grassy or rush-like plants, generally growing in moist places on the margins of lakes and streams.

Cypress, a genus of coniferous trees. The *Cupressus sempervirens*, or common European cypress, is a dark-coloured evergreen with extremely small leaves entirely covering the branches. It has a quadrangular, or, where the top branches diminish in length, pyramidal shape. The wood is hard, compact, and durable, of a reddish colour and has a pleasant smell. Amongst other members of the genus are the Indian cypress (*C. lusitanica*); the *C. funebris*, a native of China and Japan; the *C. Lawsoniana* of California, a favourite garden tree; and the evergreen American cypress or white cedar (*C. thyoides*). The *Taxodium distichum*, or deciduous cypress of the United States and Mexico, is frequently called the Virginian cypress. Its timber is valuable, and under water is almost imperishable. In parts of the United States this cypress constitutes forests hundreds of miles in extent.

Cyprian (Thascius Cæcilius), St. (c. 200–258), a Father of the African Church. About 246 he was converted to Christianity.

The Church in Carthage soon chose him presbyter, and in 248 he was made bishop. He was beheaded in 258 for having preached the gospel in his gardens at Carthage. Amongst his writings are eighty-one *Letters*, besides several works on doctrine.—Cf. *Life*, by Archbishop E. W. Benson.

Cyprinidæ. See *Carp*.

Cyprinodontidæ, a family of small soft-finned fishes, most of which are native to the fresh and brackish waters of America, but also represented in South Europe, Africa, and Southern Asia.

Cyprus, a British Crown Colony, the most easterly island in the Mediterranean. Its greatest length is 145 miles; and its area, 3584 sq. miles. The chief features of its surface are two mountain ranges, the one running close to the northern shore and extending through the long north-eastern prolongation of the island, the other and more massive (Mount Olympus) occupying a great part of the south of the island. Between them is the bare and mostly uncultivated plain called Mesaoria. The climate is in general healthy. The mountains are covered with forests of excellent timber (now under Government supervision). There are irrigation works for the storage and distribution of rainwater. Agriculture, however, is in a very backward state, only one-third of the arable land being under cultivation. Wheat, barley, cotton, tobacco, olives, raisins, and carobs are the most important vegetable products. The wine is famous, especially that known as *commandery*. Silkworms are reared, and a coarse kind of silk is woven. Salt in large quantities is produced. The minerals are valuable; the copper-mines were of great importance in ancient times, and are again being worked; gypsum, terra umbra, and marble are found in abundance. The principal towns are Nicosia, the capital, the only considerable inland town, and the seaports Larnaca and Limassol. The chief exports are carobs, wine, and cotton, with cheese, raisins, cocoons, and wool.

The Turks obtained Cyprus from the Venetians in 1571. In 1878 it was ceded to Britain by the Convention of Constantinople concluded between England and Turkey. On the outbreak of hostilities with Turkey in 1914 Great Britain annexed Cyprus. The island has become much more prosperous under British

administration, and roads and harbour-works have been constructed, and many schools opened. The head of the Government is a Governor, and there is a Legislative Council. The antiquities of the island have been the subject of repeated investigations. A revolt in 1931 by a section of the population who desired union with Greece was speedily quelled. The island was erected into a Crown Colony in May, 1925. Pop. 310,709, including 214,480 Christians and 56,428 Ottoman Turks.—**BIBLIOGRAPHY:** C. W. J. Orr, *Cyprus under British Rule*; H. C. Luke and O. J. Jardine, *The Handbook of Cyprus*; G. H. E. Jeffery, *Historic Monuments of Cyprus*.

Cypselus, a genus of birds, type of the family Cypselidæ, including the swifts. The common swift (*Cypselus apus*), a summer visitor to Britain, is black in colour except for a grey patch on the chin. It lives on insects. Swifts of the genus *Collocalia* construct edible nests.

Cyrenaica. See *Tripolitania and Cyrenaica*.

Cyrenaics, a philosophical sect founded about 380 B.C. by Aristippus, a native of Cyrene and a pupil of Socrates. The Cyrenaics taught that the true good could be found in nothing but pleasure.

Cyril, the name of three Saints or Fathers of the Christian Church.—(1) Cyril of Jerusalem (c. 315–386) in 350 or 351 became Patriarch of Jerusalem. We have some writings composed by him. (2) Cyril of Alexandria (376–444) was educated by his uncle Theophilus, Patriarch of Alexandria, and in A.D. 412 succeeded him as Patriarch. His quarrel with Nestorius, and with John, Patriarch of Antioch, regarding the twofold nature of Christ, convulsed the Church, and much blood was shed between the rival factions at the Council of Ephesus in 431, the emperor having at last to send troops to disperse them. (3) St. Cyril (827–869), 'the Apostle of the Slavs'. He converted the Chazars, a people of Hunnish stock, and the Bulgarians about A.D. 860.

Cyrillian Letters, characters used in one of the modes of writing the Slavonic language, wrongly supposed to have been invented by Cyril, the Apostle of the Slavs. It is a modification of the Greek alphabet, and is used amongst Russians, Bulgars, and all the Slavonic nations belonging to the Greek Church.

Cyrus (d. 529 B.C.), King of Persia. His grandfather, the Median King Astyages, alarmed by a prophecy that his grandson was to dethrone him, gave orders that Cyrus should be destroyed after his birth. But the boy was preserved by the kindness of a herdsman, and eventually gathered a formidable army, overthrew his grandfather (559 B.C.), and thus became King of Media and Persia. In 546 he conquered Cræsus of Lydia, and two years later took Babylon. He also subdued Phœnicia and Palestine, and restored the Jews from their Babylonish captivity. He was slain in battle with a Scythian tribe.

Cyrus, called the *Younger* (d. 401 B.C.), was the second son of Darius Nothus or Ochus. Having formed a conspiracy against his elder brother, Artaxerxes Mnemon, Cyrus was condemned to death, but was released and made Governor of Asia Minor. Here he secretly gathered an army, an important part of which consisted of 13,000 Greek auxiliaries, and marched eastwards. His brother with a large army met him in the plains of Cunaxa (401 B.C.), and in the battle which followed, although the troops of Cyrus were victorious, Cyrus himself was slain. The retreat of Greek auxiliaries is the subject of Xenophon's *Anabasis*.

Cytisus, a genus of plants belonging to the nat. ord. Leguminosæ, sub-order Papilionaceæ. They are shrubs or small trees, with leaves composed of three leaflets, and with yellow, purple, or white flowers. They belong to Europe, Asia, and North Africa. The best-known species is the common laburnum (*C. Laburnum*). The common broom (*C. Scoparius*) also belongs to this genus.

Cytology, the study of cells, which are the unit masses of the complex living substance (protoplasm, q.v.) that makes up the essential part of the bodies of organisms. The lowest plants (Protophyta), such as microscopic Algae, yeast, and bacteria, and the lowest animals (Protozoa), including innumerable animalcules, are one-celled (*unicellular*). All other plants (Metaphyta) and animals (Metazoa) are many-celled (*multicellular*), and as the scale of life is ascended there is increasing complexity in structure (*morphological differentiation*), in accordance with the division of physiological labour between groups (*tissues*) of suitably

modified cells. (See *Histology*.) A typical animal cell is a fragment of protoplasm divided into cell-body (*cytoplasm*), and a highly specialized particle (*nucleus*) which plays a dominant part in cell-life. The cytoplasm usually appears to consist of a network or foam-like aggregate of living substance holding fluid in its interstices. Near the nucleus a minute part of it is modified into a rounded *centrosphere*, containing a little body (*centrosome*) that plays an important part in cell-division. The cytoplasm contains non-living granules (*metaplasm*) which either serve as building

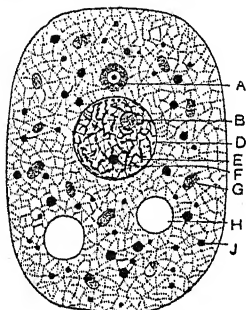
plasm are often specialized into small bodies (*plastids*) of different function. In green plants the typical pigment (*chlorophyll*) is contained in *chloroplastids*; *amyloplastids* are concerned with starch formation; and some pigments other than green (especially yellow and orange) are associated with *chromoplastids*. Many plant-cells contain reserve materials, as starch grains, aleurone grains (proteins), sugar, and inulin; or waste products, including alkaloids. There is a large amount of cell-sap contained in variously arranged spaces (*vacuoles*). Centrospheres (and centrosomes) appear to be absent in the cells of higher plants. For bibliography see *Histology*.

Cyzicus, a peninsula of Asia Minor, 60 miles south-west of Constantinople. It was once an island.

Czar. See *Tsar*.

Czartoryski, Adam George, Prince (1770–1861), Polish statesman and patriot. He fought under Kosciusko, and after the partition of his country in 1795 was sent to St. Petersburg (Petrograd), where he was made Minister of Foreign Affairs. In 1805 he resigned his office. On the outbreak of the Polish Revolution in 1830 he took an active part and became the head of the National Government.

Czechoslovakia, a Central European republic created after the European War. It consists of Bohemia, Moravia, Silesia, Slovakia, and Ruthenia, all of which, prior to 1918, belonged either to Austria or Hungary. The area of the state is 54,241 sq. miles, and the population of 13,610,405 includes 8,761,834 Czechs and Slovaks, 3,122,892 Germans, and 746,809 Magyars. Czechoslovakia, by the Constitution of 1920, is a democratic republic governed by a President, a Senate, and a Chamber of Deputies. Ruthenia is autonomous. The State religion is Roman Catholicism, and there are small minorities belonging to Protestant and other Churches. Elementary education is compulsory, and there is ample provision for advanced students. There are four universities, two at Prague (Czech and German), one at Brno (Czech), and one at Bratislava (Slovak). Prague and Brno have each Czech and German technical schools. In the west of the country is the great plain of Bohemia, but elsewhere the surface is generally mountainous with



A Typical Cell (after Wilson)

A, Centrosphere with centrosome; B, Plasmosome or nucleolus; D, Nuclear membrane; E, Chromatin network; F, Knot in chromatin network; G, Plastid; H, Vacuole; J, Passive body suspended in cytoplasmic network. (The central sphere is the nucleus.)

materials or are products of waste. The nucleus is bounded by a nuclear membrane, enclosing a very fine network of a substance (*linin*) in which are embedded numerous granules of another kind of material (*chromatin*) that stains deeply when treated with aniline or other dyes. There is also a relatively large particle (*nucleolus*), possibly consisting of reserve substances. It reproduces itself by a process of division, sometimes simple or *direct*, when the nucleus elongates and then divides into two, the halves sharing the cytoplasm, and two daughter-cells resulting. More usually, however, division is *indirect*, and in this case the nucleus undergoes very complicated changes. (See *Mitosis*.) A typical plant-cell is generally enclosed in a delicate elastic membrane (*cell-wall*) composed of cellulose, a substance allied to starch. Parts of the cyto-

fertile valleys. The boundaries are Germany, Poland, Romania, Hungary, and Austria. The principal rivers are the Elbe, the Moldau, the Vistula, the Oder, and the Danube, which crosses the southern boundary of Slovakia in certain places. Agriculture is highly developed, and the principal products are rye, oats, barley, wheat, potatoes, beets, and fruits. The area under cultivation is about 9,500,000 acres. Over 600,000 acres are annually sown with beets, and the sugar industry (annual output 1,200,000 metric tons) is most important; 33 per cent of the area is forest land. Minerals include coal, lignite, iron, and graphite, while rock-salt, lead, and gold are found in the Carpathians. Hops of fine quality are extensively grown, and there is a large beer industry centred in Pilsen. The manufactures, which include woollens, cottons, and other textiles, glass, furniture, paper, and machinery, are indicated in the following table:—

Article or Product.	Chief Centres of Industry or Production.
Textiles	Liberec, Trutnov, Brno.
Sugar	Bohemia, Moravia, Slovakia.
Glass	North Bohemia, Moravia.
Timber and forestry	Bohemia, Moravia, Slovakia, Carpathians.
Machinery, &c.	Prague, Pilsen, Brno, and districts.
Coal	Kladno, Mährisch, Ostrau.
Lignite	North Bohemia, Most (Brux).
Paper	Bohemia, Moravia, Slovakia.
Chemicals	North Bohemia, Usti nad Labem (Aussig).
Radium	Joachimsthal, North Bohemia.
Cereals and live-stock	Middle and South Bohemia, Moravia.

The exports in 1928 were valued at £129,415,000, and went principally to Austria (£19,000,000), Germany (£29,000,000), and Great Britain (£8,000,000). The imports were valued at £117,000,000, and came mainly from Germany (£29,000,000), United States (£9,000,000), and Austria (£9,000,000), Great Britain being seventh with £2,168,000. Transport facilities are good except in the east of the republic. There are about 9000 miles of railway track, more than 50 per cent of which is State owned. The expense of motor transport is exceptionally heavy. River transport on the Oder and the Danube is under State control, and the next few years should see great developments in the linking up of the Elbe, Oder, and Danube, either by canal or by railways having suitable terminal storage accom-

modation. At present a scheme for the electrification of certain Bohemian railways is being perfected. The Czechoslovaks revolted from Austria during the European War, and raised four armies to fight with the Allies. The republic came into being in 1918. See *Austria-Hungary*. —BIBLIOGRAPHY: J. Cisar and F. Pokorný, *The Czecho-Slovak Republic: a survey of its history and geography, its political and cultural organization, and its economic resources*; V. Nosek, *Independent Bohemia*.

Czechs, the most westerly branch of the great Slavonic family of races. They have their head-quarters in Bohemia, where they arrived in the fifth century. The total number of the Czechs (including Moravians, Slovaks, &c.) is about 7,500,000 (about 3,200,000 in Bohemia). They speak a Slavonic dialect of great antiquity and of high scientific cultivation. The *Czech language* is distinguished as highly inflectional, with a complex gram-

matical structure. The alphabet consists of forty-two letters, expressing a great variety of sounds. See *Bohemia*. —BIBLIOGRAPHY: Francis, Count Lützow, *A History of Bohemian Literature*; W. C. Morfill, *Grammar of the Bohemian and Czech Language*.

Czegled, a market town, Hungary, in a district yielding large quantities of grain and wine. Pop. about 36,000.

Czernin, Count Ottokar (1872–), Austrian statesman. He was Austro-Hungarian Minister at Bucharest during the European War until Aug., 1916, when Romania joined the Allies. In Dec., 1916, he succeeded Burian as Foreign Minister of Austria-Hungary. He was compelled to resign on 15th April, 1918.

Czernowitz (Romanian *Cernauti*), a town of Romania, formerly capital of the

Austrian province of Bukovina, and situated on the Pruth. The town was of great strategic importance during the European War. It is an important railway centre, and the chief manufacture is paper. It has a pop. of 87,128.

Czerny, Karl (1791-1857), Austrian pianist and musical composer. Among his pupils were Liszt, Thalberg, and other distinguished musicians.

Czerny George (1770-1817), hospodar of Serbia. His true name was George Petrovitsh, but he was called *Czerny* or *Kara George*, i.e. Black George. In 1801

he organized an insurrection of his countrymen against the Turks, took Belgrade, and forced the Porte to recognize him as hospodar of Serbia. In 1813, however, he had to retire before a superior force, and took refuge in Austria. Returning to his country in 1817, he was taken and put to death.

Czestochowa, a town in Poland, government of Piotrkow. It has a convent containing an image of the Virgin which yearly attracts many pilgrims. The manufactures include cotton goods, paper, and various cloths. Pop. 80,474.

D

D, the fourth letter in our alphabet, representing a dental sound formed by placing the tip of the tongue against the roof of the upper teeth, and then forcing up vocalized breath, or voice, into the mouth, the soft palate being raised to prevent its escape through the nose.

Dab (*Pleuronectes limanda*), a pale-brown fish with white spots belonging to the family of the *Pleuronectidæ*, or flatfishes, comprising also the sole, turbot, and halibut.

Dacca, a division of India, at the head of the Bay of Bengal; area, 16,240 sq. miles. It is one of the richest districts in India, and produces great quantities of rice. The surface is an uninterrupted flat, and is intersected by the Ganges and Brahmaputra. Dacca was at one time celebrated for its hand-woven muslins, but this branch of industry has considerably decayed. Pop. 12,037,650, Mahomedans being in a decided majority.

Dacca, a city of Bengal, has much decayed with the extinction of its staple trade in the celebrated Dacca muslin. Being free from violent heats, it is one of the healthiest stations in Bengal. An Indian university was established here in 1919. Pop. 119,450.

Dace (*Leuciscus vulgaris*), a small river fish of the family *Cyprinidæ*, a little longer and thinner than the roach. Dace nearly always swim in shoals, and seldom weigh more than a pound.

Dacia, in ancient times, a region north of the Danube, corresponding to modern Romania and Transylvania, inhabited by the Daci.

Dacier, André (1651-1722), French

classical scholar. He became perpetual secretary of the French Academy, and published many editions and translations of the ancient classics.

Dacier, Anne (1651-1720), French classical scholar and translator, wife of the preceding. She was entrusted with the editing of several of the classics *ad usum Delphini*. Amongst her other works were translations of Terence, Plautus, two plays of Aristophanes, Anacreon, and Sappho.

Dædalus, a mythical Greek architect and sculptor. He built the famous labyrinth in Crete, and invented wings for flight, which his son Icarus foolishly attempted to use, and was drowned in the Icarian Sea.

Daffodil, a popular name of a British plant, at one time applied to any species of *Narcissus*, now practically confined to *Narcissus Pseudo-Narcissus*, order *Amaryllidaceæ*. The flower is yellow and either single or double.

Daghestan, a republic of Russia, in the Caucasus, stretching along the west side of the Caspian Sea; area, 1,443 sq. miles. Its fertile valleys produce good crops of grain, and also silk, cotton, flax, and tobacco. The inhabitants, almost all professed Mahomedans, are mainly Tatars and Circassians. The capital is Temir-Khan-Shura (now Buinaksk) near Petrowsk. Pop. 786,877.

Dago, an island of Estonia, in the Baltic Sea, with productive fisheries. The inhabitants, almost all Swedes, number about 16,000. The area is 367 sq. miles.

Dagon, the god of the Philistines, whose image is generally believed to have been

in the form of a triton or merman, with the upper part human and the extremities, from the waist downwards, in the shape of the tail of a fish.

Daguerre, Louis Jacques Mandé (1789–1851), French painter and physicist, inventor of the daguerreotype. In 1814 he had his attention directed by Nicéphore Niépce to the subject of photographic pictures on metal. In 1829 they made a formal agreement to work out the invention together, but it was not till after Niépce's death (1833) that Daguerre succeeded in perfecting the process since called *daguerreotype*.

Dahlia, a genus of plants belonging to the nat. ord. Compositae, natives of Mexico, and introduced into Europe in 1789. Many varieties are popular in gardens.

Dahomey, a French possession in West Africa, formerly a negro kingdom, notorious for the savagery of its inhabitants. It lies between Togoland on the west and the British territories of Lagos and Nigeria on the east, and extends inland for about 130 miles, with a breadth of about 70 miles and an area of 42,460 sq. miles. It is well wooded and watered, and very fertile. The chief exports are maize, palm-oil, and copra. The capital is Abomey; the chief port, Whydah. In 1890 the coast came under French protection, and in 1894 the whole country was annexed by France. Pop. 842,000, including 460 Europeans.

Daimiel, a town, Spain, New Castile, province of Ciudad Real, on the left bank of the Azuer. The manufactures are linen and woollen fabrics. Pop. 15,940.

Daimler, Gottlieb (1834–1900), German engineer. He came to England, where he was employed at the Whitworth works at Manchester. He devoted himself to experiments with petroleum motors and oil engines, and invented a well-known high-speed petrol engine for motor-cars.

Dair-el-kamar, the chief town of the Druses, Syria, on a slope of Mount Lebanon. Pop. 8000.

Dairen (*Dalny*), a treaty port in the Liaotung Peninsula, Manchuria. Ceded to Japan in 1905, it is the administrative and customs centre of the Japanese district of Kwantung. Dairen has a good harbour with 34 berths capable of taking vessels up to 20,000 tons. The low-water depth at the entrance is 30 feet. There are large floating cranes, and oil-fuel and

bunker coal are available. The exports are beans, coal, kaolin, bean-oil, &c., and there is a large trade. It has rail connexion with Port Arthur and with Harbin on the Siberian Railway. Pop. 168,300.

Dairy and Dairy-farming. A dairy is that department of a farm which is concerned with the production of milk and its manufacture into butter and cheese. For milk dairies, cows that yield abundantly are selected, while for butter and cheese dairies the rich quality of the milk is the principal point. The importance of keeping the herd in a healthy condition is now being recognized, and under the Ministry of Health many conditions have to be fulfilled before the producer is licensed to sell milk. These conditions vary as he intends to sell—'Certified', 'Grade A (Tuberculin tested)', and 'Pasteurized'. For the lowest grade, that is 'Certified', every animal in the herd has to be submitted to an examination and to a prescribed tuberculin test at intervals of six months. Few dairies in Great Britain possess 'Grade A' licence.

Among the best-known cattle bred for dairy work are the Keries, Ayrshires, British Friesian, Dairy Shorthorn, Jersey, and Guernsey. While some of these cattle fulfil a double purpose, the Jersey and Guernsey are dairy cows pure and simple. The quantity of milk obtained from a cow varies according to breed and environment, but a good average annual output is between 600 and 700 gallons. Regularity in feeding is very important, and the nature of the food given has a great effect on the quality of the milk. The relative importance of various ingredients as milk-producing agents in a cow's diet is a subject of much study. Though in summer cows can be fed on pasture, in winter their natural food has to be supplemented by a variety of artificial preparations, e.g. mixtures of cotton-seed, cabbage, turnip, mangels, &c. Byres must be kept clean, well ventilated, drained, and lighted. Every care must be taken that the most scrupulous cleanliness attends all operations connected with milk. Milk is a good medium for bacteria of all kinds, and the observance of certain simple hygienic, yet not necessarily expensive, rules helps considerably to keep it pure. Cows should be milked regularly. Milking is done both by hand and by machinery. Good hand milking and expert machinery are about

equally efficient; though milking by hand is by far the more common. The milk is removed at once from the byre to the milk-house, a clean room where it is artificially cooled, and so prepared for transit by rail or for distribution.

Of the three dairy products—milk, butter, and cheese—the most important to the farmer is milk. About four-fifths of the total amount is sold in liquid form, about 15 per cent is used for butter-making, and about 5 per cent in the manufacture of cheese. With the increase in the milk trade has come the companion development of big dairy factories and creameries, especially in Denmark, America, Ireland. See *Butter; Cattle; Cheese; Milk; Pasteurization*.

Daisy, the name of a very common composite plant found in Europe, Asia, and the United States. It grows at many altitudes, and is found in flower nearly all the year round.

Dakar, a fortified French naval station in West Africa, on the small peninsula of Cape Verde, connected by railway with St. Louis, at the mouth of the Senegal. It is now the capital of all the French possessions in this quarter, and exports ground nuts, rubber, gum, &c. The harbour (depth, 24 feet) is safe, and affords good anchorage to any size of vessel. Dakar is a coaling-station, and there is a good dry-dock. Pop. 25,468.

Dakota, North and South, two of the United States, divided along the 46th parallel. *North Dakota* is bounded on the north by Assiniboia and Manitoba in the Dominion of Canada, east by Minnesota, south by South Dakota, and west by Montana. A plain, the Coteau du Missouri, traverses the state from north-west to south-east. The Missouri flows across the state south-eastward, other rivers being the Red River, Souris, Little Missouri, and James River. There are numerous lakes, the largest of which is called Devil's Lake or Minnewaukan. Part of the state (156 sq. miles) is occupied by Indian Reservations. The greater part is suitable for agriculture, and excellent wheat is grown. There are over 5000 miles of steam railway. Area, 70,837 sq. miles; pop. 646,872. Bismarck is the capital.—*South Dakota* is bounded on the west by Montana and Wyoming, east by Minnesota and Iowa, north by North Dakota, and south by Nebraska. The greater part of this state is prairie, and some of it is timbered.

The Black Hills in the south-west yield gold and silver, while tin, antimony, lead, copper, and other minerals are also found. The Missouri traverses the state and partly bounds it, and other rivers are the White, Grand, Big Cheyenne, Moreau, James or Dakota, and Big Sioux. Maize, flax, &c., are cultivated. A considerable portion of the state (568 sq. miles) is occupied by the Sioux Reservation. Pierre is the capital. There are 4000 miles of railway. Area, 77,615 sq. miles; pop. 686,547.—**BIBLIOGRAPHY:** Trinka, *North Dakota of To-day*; F. L. Ransom, *The Sunshine State*.

Dakota Indians. See *Indians, American*.

Dalbeattie, a burgh in Kirkcudbrightshire, Scotland, with paper and other mills, granite quarries, granite-polishing works, and concrete works in the neighbourhood. The harbour has accommodation for ships drawing 8 to 10 feet. Pop. (1931), 3011.

Dalecarlia, or **Dalarne**, a tract in Sweden. The name, meaning 'valley-land', is kept alive in the minds of the inhabitants by the noble struggles which the Dalecarlians, its inhabitants, made to establish and maintain the independence of the country, especially from 1519 to 1523, under Gustavus Vasa.

Dalen, Nils Gustav (1869–), Swedish engineer. Among his inventions are a method of automatic lighting for unmanned lighthouses, and for railway signals. He was awarded the Nobel prize for physics in 1912.

Dalhousie, Fox Maule Ramsay, eleventh Earl of (1801–1874). He became Baron Panmure on the death of his father in 1852, and was Secretary for War from 1855 to 1858, when he retired from political life. In 1860, on the death of his cousin, he succeeded to the title of Earl of Dalhousie.

Dalhousie, James Andrew Broun Ramsay, tenth Earl and first Marquess of (1812–1860), British statesman. After filling the offices of Vice-President (1843) and President of the Board of Trade (1844), he was appointed Governor-General of India (1847). In this post he showed high administrative talent, establishing railway lines, telegraphs, and irrigation works on a vast scale. He greatly extended the British Empire in India, annexing the Punjab, Oude, Berar, and other native states, as well as Pegu in Burma.—**BIBLIOGRAPHY:** E. Gilliat, *Lord Dalhousie: a Masterful*

Ruler; Sir. W. Lee-Warner, *Life of the Marquess of Dalhousie, K.T.*

Dalkeith, a burgh of Scotland, in the county of Midlothian (Edinburgh). Iron-founding, carpet-weaving, and brush-making are among the industries. It has an important corn market. Pop. (1931), 7502.

Dallas, a city of the U.S.A., in Texas, on the Trinity River, a flourishing place and an important railroad centre. It has manufactures of agricultural and cotton machinery, and of petroleum products. Pop. 158,976.

Dalmatia, until 1919 a province of Austria, the most southern portion of the Austrian dominions, now belonging to Yugoslavia. It consists of a long narrow tract of mountainous country and a number of large islands along the north-east coast of the Adriatic Sea, and bounded north by Croatia, and north-east by Bosnia and Hercegovina. Its whole area is 4916 English sq. miles, and pop. 621,429. The interior is occupied by a much-neglected population, and agriculture is in a very backward state. Timber is scarce, and the country does not produce sufficient grain for its own wants. Apples, pears, peaches, apricots, oranges, and pomegranates are amongst the fruits; the wines are strong and sweet. On the coast, fish, especially the tunny and the sardine, abound. The trade of the country is mostly confined to the coast towns, the chief of which are Zara (the capital), Sebenico, Cattaro, Spalato, and Ragusa. Amongst the numerous islands many are valuable for their productions, such as timber, wine, oil, cheese, honey, salt, and asphalt. The inhabitants consist of the Italians of the coast towns and the peasants of the interior, Slovenian Slavs speaking a dialect of the Slavonic. The majority are Roman Catholics. See *Yugoslavia*.

Dalny, the Russian name of *Dairen* (q.v.).

Dalou, Jules (1838-1902), French sculptor. His works include: *Maternity*, in front of the Royal Exchange, London; *Triumph of the Republic*; *Mirabeau answering Dreu-Brézé*; and *Silenus*, in the Jardin du Luxembourg, Paris.

Dalriada, the ancient name of a territory in Antrim. In the sixth century a band of Scots from this quarter settled in Argyllshire, and founded the kingdom of the Scots of Dalriada. After being almost extinguished, the Dalriadic line revived in the ninth century with Kenneth Mac-

alpine, and, seizing the Pictish throne, gave kings to the whole of Scotland.

Dalry, a town of Scotland, county of Ayr, on the Garnock, with ironworks and woollen-, blanket-, and tweed-mills. Pop. (parish) (1931), 6827.

Dalrymple, Sir David. See *Hailes, Lord*.

Dalrymple, James. See *Stair*.

Dalton, John (1766-1844), English chemist and natural philosopher. After teaching for twelve years at Kendal, in 1793 his reputation as a mathematician was established, and he was appointed to the chair of mathematics at the New College, Manchester. Here he continued to reside (though the college was removed to York in 1799), publishing from year to year valuable essays and papers on scientific subjects, while he also lectured in London and visited Paris. In 1808 he announced (*New System of Chemical Philosophy*) his atomic theory of chemical action.

Dalton-in-Furness, a town of England, in Lancashire. In its vicinity are extensive ironworks, and the ruins of the magnificent Cistercian abbey of Furness. Pop. (1931), 10,338.

Dalton Plan. See *Education*.

Dalyell, or Dalzell, Thomas (c. 1599-1685), Scottish soldier. Returning from Russia to England at the Restoration, he was made Commander-in-Chief of the forces in Scotland, and made himself notorious by his ferocity against the Covenanters.

Damages, in law, pecuniary compensation paid to a person for loss or injury sustained by him through the fault of another. It is not necessary that the act should have been a fraudulent one; it is enough that it be illegal, unwarrantable, or malicious. If, however, a person has suffered a loss through fraud or delict on the part of another, that person has not only a claim to ordinary damages, but may also claim remote or consequential damages, and may estimate the amount of the loss he has sustained not at its real value, but at the imaginary value which he himself may put upon it, subject, however, to the modification of a judge or a jury. In other cases the damages cover only the loss sustained estimated at its real value, together with the expenses incurred in obtaining damages.

Daman, a Portuguese settlement and port on the Gulf of Cambay, India. The

settlement consists of Daman proper (area, 22 sq. miles; pop. 56,084) and of Nagar Havili (area, 60 sq. miles; pop. 12,636). There are great teak forests, and the wood is much used in shipbuilding. Tobacco, wheat, and rice are grown. The port has a good roadstead. Principal exports are salt, woven fabrics, and timber.

Damanhūr, a town of Egypt, capital of the province of Bahreh, 38 miles E.S.E. of Alexandria. It has manufactures of cotton and wool. Pop. (1927), 51,720.

Damar, a town, Arabia, Yemen. Pop. about 20,000.

Damaraland, a country in S.W. Africa Protectorate, north of Namaqualand; area, 100,000 sq. miles; pop. 132,000. The port is Walvis Bay. See *South-West Africa*.

Damascenus, John, John of Damascus (c. 676–c. 760). He was the author of the first system of Christian theology in the Eastern Church. He is supposed to be the author of the famous religious romance *Barlaam and Josaphat* (q.v.).

Damascus, a city in Syria, formerly the capital of the Turkish vilayet of Syria, supposed to be the most ancient city in the world. It is beautifully situated on a plain which is covered with gardens and orchards and watered by the Barrada. The city, in spite of its attractive external appearance, has narrow streets, dilapidated houses, and accumulations of filth everywhere. The chief buildings are the Omniad Mosque, the Serai, and the Citadel. The bazaars are a notable feature of Damascus. In the midst of the bazaars stands the Great Khan, it and thirty inferior khans being used as exchanges or market-places by the merchants. One of the most important and busiest streets is 'Straight Street', mentioned in connexion with the conversion of the Apostle Paul. Damascus is an important emporium of trade in European manufactures; it is also a place of considerable manufacturing industry in silk, damasks, cotton and other fabrics, tobacco, glass, and soap. Saddles, fine cabinet-work, and articles of jewellery are made; but the manufacture of the famous Damascus blades no longer exists. It is one of the holy Moslem cities. It now has waterworks, gas, electricity, and tramways, and railways connect it with Beirout, the Hauran, the Hejaz, &c. Pop. 170,000. As a result of an insurrection in 1925 the French shelled Damascus and did much damage. See *Syria and Lebanon*.

Damascus-steel, a kind of steel originally made in Damascus and the East, greatly valued in the making of swords. It is a laminated metal of pure iron and steel, carbon being present in excess of ordinary proportions.

Dambool, a village of Ceylon, 70 miles north-east of Colombo. A colossal statue of Buddha, hewn out of the rock, is in one of the numerous large caves near the village.

Dame, a title of honour which, in the age of chivalry, distinguished high-born ladies from the wives of citizens and the commonalty. In England the wives or widows of baronets and knights are entitled to style themselves 'Dame' (followed by Christian and surname), though in practice they seldom do so, 'Lady' (followed by surname only) being preferred. Dame is also the title of women upon whom the honour of the first or second class of the Order of the British Empire has been conferred. They style themselves G.B.E., Dame Grand Cross, and D.B.E., Dame Commander.

Dame's-violet, or **Dame-wort**, the popular names of *Hesperis matronalis*, nat. ord. Cruciferae, a British plant with a perennial root; the stems, from 2 to 3 feet high, are few or solitary, and the leaves are serrate. It flowers in May and June.

Damien, Father (1840–1889), Belgian missionary. He entered the Church when eighteen years of age, and in 1863 went out as a missionary to the Pacific Islands. In 1873 he volunteered to look after the spiritual needs of a settlement of lepers on the Island of Molokai, and there he remained until his death, having been stricken with leprosy in 1885.

Damietta, a town of Egypt, on one of the principal branches of the Nile, about 6 miles from its mouth. It has a considerable trade with the interior in fish and rice, though the silting of the harbour and the rise of Alexandria have lessened this considerably. Pop. (1927), 34,812.

Dammar Resin, a gum or resin of several kinds produced by different trees. The East Indian or cat's-eye resin is got from the *Agathis orientalis*. *Sal* dammar is produced by the sal tree of India, *rock* dammar by *Hopéa odorata* and other species of trees; *black* dammar is another Indian species. They are all used in the manufacture of varnishes.

Dammooda, a river of India, Presi-

dency of Bengal, which enters the Hooghly near its mouth; length, 350 miles.

Damocles, a native of Syracuse, and one of the courtiers and flatterers of the tyrant Dionysius the elder, who one day invited him to a magnificent banquet. In the midst of the entertainment Damocles happened to look upwards, and perceived with dismay a naked sword suspended over his head by a single hair.

Damoh, a town, India, in the Jubbulpore division of the Central Provinces. Pop. 17,000.—The district of Damoh has an area of 2800 sq. miles, and a pop. of 330,000.

Damon and Phintias, two Syracusans, celebrated as models of constant friendship. Phintias had been unjustly condemned to death by Dionysius the younger, tyrant of Sicily; but, having to leave Syracuse to arrange his affairs, his friend Damon was taken as a pledge that Phintias should return on the day fixed. Phintias, however, being unexpectedly detained, had great difficulty in reaching Syracuse in time to save Damon being executed in his place, and Dionysius was so affected by this proof of their friendship that he pardoned Phintias.

Dampier, William (1652–1715), English navigator. In 1697 he published his *Voyage Round the World*, which became very popular, and next year he was appointed commander of a royal sloop-of-war, fitted out for a voyage of discovery in the Australian seas. In 1703 he sailed for the South Seas in command of a privateer, returning in 1707; and next year he shipped as pilot with Captain Woodes Rogers, and accompanied him on his voyage round the world. Besides the book mentioned, he wrote *Voyages and Descriptions*, a supplement to it, and *Voyage to New Holland*.

Dampier Island, an island off the north-east coast of New Guinea. It consists of an active volcano.

Dampier's Land, a Western Australian peninsula washed on the north by King Sound. It is very fertile.

Damping-off Disease, of plants, a fatal disease of young seedlings, especially of 'mustard and cress', due to a parasitic Fungus, *Pythium debaryanum*, one of the Oomycetes. Infected plants collapse, and soon die and become putrid.

Dams, banks or masonry constructions across a river or stream for the purpose

of impounding or holding back the water to give increased head, for conserving supplies, for flooding land, or for rendering the stream above the dam navigable by increasing the depth or reducing the velocity of the current. The normal form of profile or cross-section has a batter of 1 in 10 on the up-stream face, a thickness at top-water level of $\frac{1}{4}$ th to $\frac{1}{5}$ th the height, the down-stream face being compounded of varying curves to meet the base. In plan, the dam may be built either in a straight line across the stream, or in the form of a flat arch, with the convex side facing up-stream. The Vyrnwy dam (Liverpool Water Supply), completed in 1890, is 1350 feet long, 144 feet high, and 84 feet deep. The Bassano dam, on the Bow River, in Alberta, Canada, is a mile and a half long, and raises the level of the water over 40 feet. The Aswan dam, across the Nile, is a mile and a quarter long, 112 feet high, and the reservoir when full forms a lake 130 miles long. It is important to consult *Gezira*. See *Embankment*; *Reservoir*.—Cf. J. Husband and W. Harby, *Structural Engineering*.

Damson, a variety of the common plum (*Prunus domestica*). The fruit is rather small and oval, and its numerous sub-varieties are of different colours: black, bluish, dark-purple, and yellow. It is much used in cookery.

Dana, James Dwight (1813–1895), American naturalist. He wrote: *System of Mineralogy*, *Manual of Mineralogy*, *Coral Reefs and Islands*, *Manual of Geology*, *Textbook of Geology*, and many reports and papers.

Dana, Richard Henry (1787–1879), American writer. He published several collections of poems and two novels.

Dana, Richard Henry (1815–1882), son of the preceding. He was the author of *Two Years before the Mast*.

Danaë, in Greek mythology, daughter of Acrisius, King of Argos. She was shut up by her father in a brazen tower, as there was a prophecy that her son would kill her father, but Zeus, who loved her, descended to her in a shower of gold. Set adrift on the waves by her father, she reached safely one of the Cyclades, where her child, Perseus, was brought up.

Danaïdes, in Greek mythology, the fifty daughters of Danaus, who were all condemned with the exception of one (Hypermnestra) eternally to pour water

into a vessel full of holes. This was their punishment for murdering their husbands, the forty-nine sons of Ægyptus, on their wedding night.

Danakilis, Ethiopian tribes inhabiting the district between the Red Sea and Abyssinia. Fishing and cattle-rearing are the chief occupations. They are partly of Arab descent and number about 70,000.

Danbury, a town in Connecticut, U.S.A. It manufactures hats, shirts, and sewing-machines. Pop. 18,943.

Danby, Francis (1793-1861), English painter. He established his reputation by *The Upas Tree* (1820), and by his *Sunset at Sea after a Storm* (1823). Among his subsequent pictures are: *The Age of Gold*, *The Enchanted Island—Sunset*, and *The Painter's Holiday*.

Dancing. Modern dancing may be regarded as dating from the fifteenth century renaissance in Italy, but it was thoroughly organized at a somewhat later period in France, which country, though possessing few, if any, national dances of its own, adopted and perfected those of other lands. The dances of the French peasantry were of a light and lively character; those of the Court and upper classes were extremely grave and dignified, the *pavane* being rather a procession than a dance. The later *saraband* was highly popular, while from the *courante* were derived the *minuet*, and, about 1770, the *waltz*, which is still a general favourite. The old English *Morris dance*, introduced to this country in the reign of Edward III, was properly the 'Moorish' dance, derived through Spain. Among British national dances are the Scottish *reel* and *strathspey*, and the Irish *jig*. In more recent years such importations as the American *barn dances*, *fox trots*, and similar novelties, with the still more recent *tango* and *charleston* have been introduced, and have proved most popular.—BIBLIOGRAPHY: T. and M. W. Kinney, *The Dance*; E. L. Urlin, *Dancing, Ancient and Modern*.

Dandelion (*Leontodon Taraxacum*), a plant belonging to the nat. ord. Compositeæ, indigenous to Europe, but now also common in America. The leaves are all radical, and runcinate or jagged on the margin. The stems are hollow and have one large bright-yellow flower-head and a tapering milky perennial root, extracts from which are used as a bile stimulant. A milky, bitter juice runs through the

whole plant, and the seed is dispersed by the wind.

Dandolo, Andrea (1310-1354), Doge of Venice. He greatly extended Venetian commerce by opening a trading connexion with Egypt. He wrote a chronicle of Venice, comprising the history of the Republic from its commencement to 1339.

Dandolo, Enrico (c. 1120-1205), Doge of Venice. On the formation of the fourth Crusade, Dandolo induced the Senate to join in it, and by its help recovered the revolted town of Zara. Constantinople was next stormed, the blind old doge, it is said, leading the attack. In the division of the Byzantine Empire the Venetians added much to their dominions.

Danegelt, or **Danegeld** (that is, 'Dane tax'), an annual tax laid on the English nation for maintaining forces to oppose the Danes, or to furnish tribute to procure peace. When the Danes became masters of England, the *danegelt* was a tax levied by the Danish princes on every hide of land owned by the English. It continued to be levied until 1163.

Danelagh, the ancient name of a strip of territory extending along the east coast of England from the Thames to the Tweed, ceded by Alfred to Guthrun, king of the Danes, after the battle of Ethandune. This name it retained till the Norman Conquest, its inhabitants being governed by a modification of Danish law and not by English law.

Danger Island, a South Pacific island annexed to New Zealand in 1901. Pop. 530.

Daniel, Samuel (1562-1619), English historian and poet. His great poem, *The History of the Civil Wars between the Houses of York and Lancaster*, is written with much rhetorical grace and dignity of style. He wrote also *Musophilus*, a dialogue; and a *History of England* till the time of Edward III.

Daniel, Book of. This book is divided into an historical and a prophetic part. Modern criticism generally regards it as written during the oppression of the Jews under Antiochus, about 170 B.C. It is partly in Aramaic.

Daniell, John Frederick (1790-1845), English physicist. His most important works are his *Meteorological Essays* and the essay on *Artificial Climate*. He made important discoveries, chief amongst which is his voltaic cell for maintaining a powerful and continuous current of electricity.

Daniell's Cell. See *Voltaic Cell*.

Dannecker, Johann Heinrich (1758–1841), German sculptor. His best works are his statue of Christ and his *Ariadne seated on a Panther*. His portrait busts are excellent; those of Schiller, Lavater, and the Duchess Stephanie of Baden deserve particular mention.

Dannemora, a village in Sweden, 24 miles N.N.E. of Uppsala, celebrated for its iron-mines, which have been worked for upwards of three centuries, and produce the finest iron in the world.

Dante Alighieri (1265–1321), the greatest of Italian poets. Owing to the strife between the rival factions of Bianchi and Neri the poet became, and to the end of his life remained, an exile. During this period he is said to have visited many cities, Arezzo, Bologna, Sienna, and even Paris. In 1314 he found shelter with Can Grande della Scala at Verona, where he remained till 1318. In 1320 we find him staying at Ravenna with his friend Guido da Polenta. In Sept., 1321, his sufferings and wanderings were ended by death. His great poem, the *Divina Commedia* (Divine Comedy), is divided into three parts, entitled Hell, Purgatory, and Paradise. The poet dreams that he has wandered into a dusky forest, when the shade of Virgil appears and offers to conduct him through hell and purgatory. The journey through hell is first described, and the imaginative power with which the distorted characters of the guilty and the punishments laid upon them are brought before us has perhaps no rival in the work of any one man except Æschylus and Shakespeare. From hell the poet, still in the company of Virgil, ascends to purgatory, where the scenes are still mostly of the same kind though the punishments are only temporary. In the earthly paradise Dante beholds Beatrice in a scene of surpassing magnificence, ascends with her into the celestial paradise, and after roaming over seven spheres reaches the eighth, where he beholds "the glorious company which surrounds the triumphant Redeemer". In the ninth Dante feels himself in presence of the divine essence, and sees the souls of the blessed on thrones in a circle of infinite magnitude. The Deity himself, in the tenth, he cannot see for excess of light. Dante may be said not only to have made Italian poetry, but to have stamped the mark of his personality

upon all modern literature. His influence upon English letters begins with the poetry of Chaucer. Dante's moral system is largely derived from St. Thomas, and he certainly owes much to the Neo-Platonics. There are many notable translations of Dante's great poem. Amongst English versions we may mention those of Cary, Longfellow, Dean Plumptre, and Hasel-foot, and prose translations by Dr. John Carlyle, C. E. Norton, and H. F. Tozer. The *Vita Nuova* has been admirably translated by D. G. Rossetti in his *Early Italian Poets*. Dante's other works are: *Il Convito* (The Banquet); *Il Canzoniere*, a collection of poems; a Latin treatise, *De Monarchia*; a treatise on the Italian language, entitled *De Vulgari Eloquentia*; and an inquiry into the relative altitude of the water and the land, *De Aqua et Terra*.—**BIBLIOGRAPHY:** P. J. Toynbee, *Dante Alighieri: his Life and Works*; J. A. Symonds, *A Study of Dante*; M. W. Vernon, *Readings in Dante*; M. L. E. Castle, *Dante*; R. T. Holbrook, *Portraits of Dante*.

Danton, Georges Jacques (1759–1794), one of the great figures in the French Revolution. He founded the club of the Cordeliers, was foremost in organizing and conducting the attack on the Tuileries, 10th Aug., 1792, and as a reward for such services was made Minister of Justice and a member of the Provisional Executive Council. The rivalry between him and Robespierre soon reached a point when one must succumb, and the crafty Robespierre succeeded in having Danton condemned by the revolutionary tribunal as an accomplice in a conspiracy for the restoration of monarchy, and executed.—**BIBLIOGRAPHY:** A. H. Beesly, *Life of Danton*; H. Belloc, *Danton*.

Danube, a river of Europe, having a direct length of 1000 miles and a length, including windings, of 1780 miles. It rises in Baden, in the Black Forest, and flows north-east to Ulm, in Würtemberg, where it becomes navigable for vessels up to 100 tons. At Ratisbon, in Bavaria, it becomes navigable for large steamers. It enters Austria at Passau, flows through Vienna, and above Budapest turns south till it is joined by the Drava. It then runs through Yugoslavia (Belgrade is built on its banks), and for a long distance is the boundary between Romania and Bulgaria. Turning north at Silistra, it flows between Romania

proper and Bessarabia, and falls into the Black Sea by three different outlets. The main affluents on the right bank are the Iser, Inn, Raab, Drava, Sava, and Morawa, and on the left bank the Regen, Waag, Theiss, Sereth, and Prut. The Danube drains an area of 315,300 sq. miles. It is the chief commercial river of Europe, is open to all nations, and is connected by canals with the Rhine and the Elbe. The Sulina Mouth is the chief outlet for shipping. The scenery on the banks of the Danube is magnificent, especially in Austria. In Hungary it flows through great plains, and is often flanked by dreary marshes. At Orsova is the famous Iron Gate, where the river is obstructed by huge rocks. At places the Danube is over a mile wide and 40 feet deep, while certain narrows on the lower reaches have a depth of nearly 200 feet. The main outlet channel has a uniform depth of 18 feet.—BIBLIOGRAPHY: Sir C. A. Hartley, *Description of the Delta of the Danube*; W. Jerrold, *The Danube*.

Danvers, a town of the U.S.A., in Massachusetts, with tanneries and manufactures of boots and shoes. Pop. 11,000.

Danville, three towns of the U.S.A.—(1) In Illinois; it has coal-mines. Pop. 33,776.—(2) In Pennsylvania; it has blast-furnaces and rolling-mills. Pop. 7517.—(3) In Virginia; an important tobacco centre. Pop. 21,539.

Danzig, a port on the Vistula, near the Baltic, formerly Prussian, but now a Free City. The area of the Free City's territory is 754 sq. miles, and the coast-line is 35 miles long. This state was formed by the Treaty of Versailles in 1919, and in 1920 the Constitution was approved by the League of Nations, which appoints a High Commissioner. There is a Senate and a Diet. The main industries are ship-building and brewing. Danzig is an important market and shipping town for German, Polish, and Russian products. The export trade is largely in grain, sugar, and lumber. Britain is the principal buyer of lumber. The harbour can accommodate vessels drawing up to 26 feet. There are two floating docks (lifting capacity, 2600 tons and 3500 tons), three graving docks taking ships up to 7500 tons, and the former imperial navy dock for the largest vessels. Danzig, being the port of Poland, is a unit in the Polish customs administration. Pop. of Free City, 365,000 (Danzig proper,

194,953).—Cf. Simon Ashkenazy, *Danzig and Poland*.

Daphnē, in Greek mythology, a nymph beloved by Apollo. Deaf to the suit of the god, and fleeing from him, she besought Zeus to protect her. Her prayer was heard, and at the moment Apollo was about to encircle her in his arms she was changed into a laurel.

Daphne, a genus of plants, nat. ord. Thymeleaceæ. They are shrubs, inhabiting chiefly the south of Europe and temperate Asia. *D. Laureola* (spurge laurel), the only British species, has an irritant bark, and its berries are poisonous.

Dar-al-Baida, Arab name for *Casablanca* (q.v.).

Darbhanga, a town of India, in the Patna division of Behar, in a low-lying district subject to inundation. It has a large trade in saltpetre, oil-seeds, and timber. Pop. 53,700.—The district of Darbhanga, watered by the Ganges, has an area of 3348 sq. miles. It is very fertile. Pop. 2,929,682.

D'Arblay, Frances, known as Fanny Burney (1752–1840), English novelist. She was the second daughter of Dr. Burney, author of the *History of Music*. She is chiefly remembered for her novels, of which she produced four—*Evelina*, *Cecilia*, *Camilla*, and *The Wanderer*. She published the memoirs of her father, which appeared in 1832, and seven volumes of her *Letters and Diaries*, edited by her niece, were also published.

Dardanelles, a narrow channel which connects the Sea of Marmara with the Ægean Sea and separates Europe from Asia. It is about 40 miles in length, and varies in breadth from 1 to 4 miles. A rapid current runs southward. On the Asiatic side the country is fine and fertile, but the European side is steep and rugged, though densely peopled and highly cultivated. Both shores were highly fortified prior to the European War. By treaty made in 1841 between the five Great Powers and Turkey, confirmed by the Peace of Paris in 1856, it was settled that no non-Turkish man-of-war should pass the strait without the express permission of the Turkish Government. On 3rd Nov., 1914, the forts were bombarded by a combined British and French squadron, and in April, 1915, an army was landed in the Dardanelles, but the attempt of the Allies to force the Dardanelles proved a failure.

A Dardanelles Commission was subsequently constituted by the British Government in 1916, and the first report published on 8th March, 1917. The Treaty of Sèvres (1920) between the Allied Powers and Turkey was rendered abortive, but in accordance with the Treaty of Lausanne (1923, entered into force, 1924), the defences of the Dardanelles and the Bosphorus were demolished and the areas immediately adjacent, on both sides of the Straits, were demilitarized. Except for these provisions Turkey holds the Dardanelles area in unrestricted sovereignty. See *European War*.

Dardistan, a mountainous region in Asia, on the Upper Indus, included within the boundaries of British India, which is held by the Dards and other tribes owing little allegiance to any superior.

Dar es Salaam, a seaport in Tanganyika Territory (formerly German East Africa), with a good natural harbour and a dock. The depth at entrance is about 30 feet. It carries on a considerable trade in rubber, ivory, and other African commodities. Pop. 25,000, including 1000 Europeans.

Darfur, a considerable region of the Anglo-Egyptian Sudan, forming a large oasis in the south-east corner of the Great Desert. On the east it has Kordofan and on the west Bornu. The inhabitants are Mahomedans and negroes, semi-barbarous and very degraded. Their occupation is chiefly agriculture, and cattle form their principal wealth. The ruler is a native sultan. There is a trade with Egypt carried on by means of caravans. Among the articles that Darfur exports are ivory, ostrich feathers, gum, and copper. El Fasher is the capital. The country contains the watershed between the basin of Lake Chad and that of the Nile. Area, 150,000 sq. miles. Pop. estimated at 750,000. — Cf. A. M. Hassanein Bey, *The Lost Oases* (the record of a journey through Kufra to Darfur).

Darien, Gulf of, a gulf of the Caribbean Sea at the north extremity of South America, between the Isthmus of Panama and the mainland.

Darien, Isthmus of, often used as synonymous with the Isthmus of Panama, but more strictly applied to the neck of land between the Gulf of Darien and the Pacific.

Darien Scheme, a celebrated financial project, conceived and set afloat by William Paterson, a Scotsman, towards

the close of the seventeenth century. He proposed to form an emporium on each side of the Isthmus of Darien or Panama for the trade of the opposite continents. The scheme was supported largely by Scots, and Scotland subscribed £400,000 to it. In 1698 five large vessels laden with stores, and with 1200 intending colonists, sailed for the Isthmus of Darien. The settlement was formed in a suitable position, but nothing else had been rightly calculated. Many of the colonists were men who knew nothing about colonizing; the provisions were either improper for the climate or soon exhausted; the merchandise they had brought was not adapted for the West Indian market. For eight months the colony bore up, but at the end of that time the survivors were compelled by disease and famine to abandon their settlement and return to Europe. Two of the ships were lost on the way home, and only about thirty men, including Paterson, reached Scotland.

Darius, the name of several Persian kings.—(1) **Darius I** (d. 485 B.C.), fourth King of Persia, attained the throne in 521 B.C. He reduced, after a two years' siege, the revolted city of Babylon, and led an expedition of 700,000 men against the Scythians on the Danube. To revenge himself against the Athenians who had promoted a revolt of the Ionian cities, he sent an army under Mardonius to invade Greece. But the ships of Mardonius were destroyed by a storm in doubling Mount Athos (492 B.C.), and his army was cut to pieces by the Thracians. Darius, however, fitted out a second expedition of 500,000 men, which was met on the plains of Marathon by an Athenian army 10,000 strong, under Miltiades, and completely defeated (490 B.C.).—(2) **Darius II** ascended the throne in 423 B.C., and died in 404 B.C. His son Cyrus is familiar to us through Xenophon's *Anabasis*.—(3) **Darius III** (d. 330 B.C.), great-grandson of Darius II, was the twelfth and last King of Persia. He was totally defeated by Alexander the Great at the battles of Granicus, Issus, and Gaugamela, and had to seek safety in flight (331 B.C.). Alexander then captured Susa, the capital, and Persepolis, and reduced all Persia. Meanwhile Darius was collecting another army at Ecbatana in Media, when a traitorous conspiracy was formed against him by which he lost his life.

Darjeeling, a district of India, in the extreme north of the lieutenant-governorship of Bengal, near the Sikkim frontier; area, 1234 sq. miles. The growing and making of tea is the staple industry, and coffee, cinchona, and cotton are also cultivated. One-third of the area is forest land. Pop. 250,000.

Darjeeling, the chief town of the above district, is a sanitary station and the summer quarters of the Bengal Government, and stands in a bleak but healthy situation. Pop. 17,053, much increased in the hot weather.

Darlaston, a town and parish, England, 17 miles south by east of Stafford. It has extensive coal- and iron-mines. Pop. (1931), 19,736

Darling, Grace (1815-1842), English heroine. In 1838 the steamer *Forfarshire*, with forty-one passengers on board besides her crew, became disabled off the Farne Islands during a storm, and was thrown on a rock, where she broke into two, part of the crew and passengers being left clinging to the wreck. Next morning Grace Darling and her father, each taking an oar, reached the wreck and succeeded in rescuing nine sufferers.

Darling, a name of several applications in Australia.—The *Darling River* rises in the north-east of New South Wales and joins the Murray.—*Darling District* is a pastoral district, about 50,000 sq. miles in extent, in the south-west of New South Wales, and watered by the Darling and the Murray.—The *Darling Downs* are a rich tableland west of Brisbane, in Queensland. They are well watered, and measure about 6000 sq. miles.—The *Darling Range* is a range of granite mountains in Western Australia.

Darlington, a borough, England, county Durham. The woollen manufacture is carried on to a considerable extent, and there are large ironworks, and works manufacturing steel, locomotive engines, and iron bridges. Pop. (1931), 72,093.

Darlingtonia, a remarkable genus of American pitcher-plants, nat. ord. Sarraceniacæ. A single species is known from California. The leaves are long and trumpet-shaped, with a wing rising from one side of the mouth.

Darmstadt, a town, Germany, Republic of Hesse, in a sandy plain, on the Darm, 15 miles south of Frankfurt. Among the remarkable buildings are the old

palace and the Rathhaus, or town hall, built in 1580. Darmstadt has numerous and varied industries, which include machinery, carpets, chemicals, and hats. Pop. (1925), 89,465.

Darnel, the popular name of *Lolium temulentum*, the only poisonous British grass. Its properties are due to the constant presence of a poisonous fungus in the grains. It grows in cornfields.

Darnétal, a town, France, department of Seine-Inférieure, 2½ miles east of Rouen. There are extensive woollen-factories and spinning-mills. Pop. 7218.

Darnley, Henry Stewart, Lord (1545-1567), son of the Earl of Lennox and Lady Margaret Douglas, a niece of Henry VIII (her mother being first married to James IV). In 1565 he was married to Mary Queen of Scots. It was an unfortunate match, and ere long gave rise first to coolness, then to open quarrel, and finally to deadly hate, which the murder of Rizzio, to which Darnley was a party, increased. Mary affected, however, to be reconciled to him. After the birth of a son, subsequently James VI, Darnley was seized at Glasgow with smallpox, from which he had barely recovered when Mary visited him, and had him conveyed to an isolated house called Kirk o' Field, close to the Edinburgh city walls. This dwelling was blown into the air with gunpowder (10th Feb., 1567). The dead bodies of Darnley and his page were found in a field at a distance of 80 yards from the house. Strong circumstantial evidence points to Bothwell as the murderer, and to Mary as an accomplice in the crime.

Darrang, a district of Assam, India, forming a portion of the upper valley of the Brahmaputra; area, 3418 sq. miles; pop. 377,314. Virgin forests cover a large portion of the region, and tea and rice are grown.

Dartford, a town, England, Kent, on the Darent. On the river are numerous paper-, corn-, and oil-mills, a large foundry, and an extensive gunpowder manufactory. Pop. (1931), 28,928.

Dartmoor, an extensive upland tract in England, in the western part of Devonshire, often called the *Forest of Dartmoor*. It occupies about 150,000 acres, and belongs to the Duchy of Cornwall. Cattle and sheep are fed on the coarse grass during the summer months. Several of the rugged granite hills are of considerable

height, Yes Tor being 2050 feet high. There is a convict prison on Dartmoor.

Dartmouth, a borough and seaport of Devon, England, near the mouth of the Dart. The harbour is safe and commodious, and the port is much resorted to by ocean steamers for coal. There is accommodation for the largest vessels. The Royal Naval College for cadets is there. Pop. (1931), 6707.

Dartmouth, a town, Nova Scotia, on Halifax Harbour. There are lumber-mills, foundries, and sugar and oil refineries. Pop. 7899.

Daru, Pierre Antoine Noel Matthieu Bruno, Count (1767–1829), French statesman and author. He became chief Minister of State in 1811, and was called to the Chamber of Peers in 1818. His chief works are his *History of the Venetian Republic*, *Life of Sully*, and *History of Brittany*.

Darwen, a municipal borough of Lancashire, England, $3\frac{1}{2}$ miles south of Blackburn. It carries on cotton-spinning, and manufactures paper-hangings (its great speciality), paper, iron castings, and earthenware. Pop. (1931), 36,010.

Darwin, Charles Robert (1809–1882), English naturalist. He was educated at Shrewsbury School, and at the Universities of Edinburgh and Cambridge. In 1831 he was appointed naturalist to the surveying voyage of H.M.S. *Beagle*, commanded by Captain (afterwards Admiral) Fitzroy. The vessel sailed in Dec., 1831, and did not return till Oct., 1836, after having circumnavigated the globe. In 1839 he published his *Journal of Researches during a Voyage round the World*. In 1859 his name attained its great celebrity by the publication of *The Origin of Species by Means of Natural Selection*. This work may be said to have effected nothing less than a revolution in biological science. His other works include: a treatise on the *Fertilization of Orchids* (1862), *Descent of Man and Variation in Relation to Sex* (1871), *The Expression of the Emotions in Man and Animals* (1872), *Movements and Habits of Climbing Plants*, *Insectivorous Plants* (1875), *Cross and Self Fertilization* (1876), *The Power of Movement in Plants* (1880), and *The Formation of Vegetable Mould* (1881).—**BIBLIOGRAPHY**: Sir Francis Darwin, *The Life and Letters of Charles Darwin*; A. R. Wallace, *Darwinism*; G. J. Romanes, *Darwin and after Darwin*.

Darwin, Erasmus (1731–1802), English physician and poet. His name is chiefly known from his poem of *The Botanic Garden*, which first appeared in 1789; the second part of it, which was known as *The Loves of the Plants*, appeared anonymously in that year, and the whole was printed together in 1791. Charles Darwin was his grandson.

Darwin, Sir Francis (1848–1925), son of Charles Darwin. He has written: *Elements of Botany*, *Life and Letters of Charles Darwin*, and *Foundations of the Origin of Species*.

Darwin, Sir George Howard (1845–1912), son of Charles Darwin. He wrote many learned papers on subjects more or less connected with astronomy, and especially on tidal action and its effects, including the effects of tidal friction on the rotation of the earth and the moon. He was president of the British Association in 1905, when it held its sittings in South Africa, and was again elected to that office shortly before his death.

Darwin (Australia). See *Palmerston*.

Dasent, Sir George Webbe (1817–1896), Icelandic scholar and miscellaneous writer. His works include translations of *The Prose or Younger Edda*; *The Norsemen in Iceland*; *Popular Tales from the Norse*, a collection of delightful folk-tales; and *Tales from the Fjeld*, a similar collection.

Dass, Petter (1647–1708), Norwegian poet. His principal poem, *The Trumpet of Northland*, is one of the most popular national poems.

Dasyure, or **Dasyurus**, a genus of climbing marsupials known as brush-tailed opossums. The family (Dasyuridae) includes the Tasmanian devil (*Sarcophilus ursinus*), a savage carnivorous beast about the size of a badger.

Date, the fruit of the date-palm or the tree itself, the *Phoenix dactylifera*. Its stem shoots up to the height of 50 or 60 feet without branch or division, and of nearly the same thickness throughout its length. From the summit it throws out large feather-shaped leaves, and a number of spadices, each of which in the female plant bears a bunch of from 180 to 200 dates, each bunch weighing from 20 to 25 lb. The fruit forms one of the staple articles of diet in Turkey, Western Asia, Northern Africa, and Arabia. The leaves are used as thatch and the fibre for rope-making. Persia, Palestine, Arabia, and

the north of Africa are best adapted for the culture of the date tree.



1, Branch of Date Palm. 2, Male flowers. 3, Female flowers. 4, Ripe dates.

Date-plum, the name given to several species of *Diospyros*, a genus of trees of the ebony family. The common date-plum is a native of temperate Europe. The American date-plum, or persimmon (*D. virginiana*), attains a height of 50 or 60 feet; the fruit is nearly round, is very astringent, but edible after being frosted. The Chinese date-plum (*D. Kaki*) is cultivated for the sake of its fruit.

Datia, a native state in Bundelkhand, India, under the Central India Agency. Area, 911 sq. miles; pop. 173,000. The principal products are pulses, wheat, and cotton. Datia is the chief town of the state. Pop. 25,000.

Datura, a genus of plants, order Solanaceae, with large trumpet-shaped flowers. *D. Stramonium* is the thorn-apple, possessing strong narcotic properties. The dried leaves of *D. Stramonium*, and *D. Tatula*, an American species, are smoked as a cure for asthma.

Daubenton, Louis Jean Marie (1716-1799), French naturalist. In 1742 he began to assist Buffon in the preparation of his great work on natural history, the anatomical articles of which were prepared by him.

Daudet, Alphonse (1840-1897), French novelist. His best works include: *Fromont*

jeune et Risler aîné (1874); *Jack* (1876); *Lettres de Mon Moulin* (1866); *Sapho* (1884); *Tartarin sur les Alpes* (1886), a sequel to *Les Aventures Prodigieuses de Tartarin de Tarascon* (1874).

Daugavpils, the Lettish name of the town known conventionally as *Dvinsk* (q.v.).

Dauphin, the title of the eldest son of the King of France prior to the Revolution of 1830. Humbert III, the last lord of Dauphiné, ceded his province to the King of France in 1349, on condition that the title of the heir-apparent to the French throne should perpetuate the title of Dauphin.

Dauphin, a town, Manitoba, Canada, on Vermilion River. It has a flour-mill, seven elevators, two creameries, and several oil companies. It is served by the C.N.R. Pop. 3885.

Davenant, Sir William (1606-1668), English poet and dramatist. During the Civil War he fought on the Royal side, was made a lieutenant-general, and received the honour of knighthood. His works consist of dramas, masques, addresses, and the epic *Gondibert*, an unfinished poem in 1500 heroic stanzas; he also assisted Dryden in his perversion of *The Tempest*.

Davenport, a city of Iowa, U.S.A., situated at the foot of the upper rapids of the Mississippi, near Rock Island. Woollen goods, agricultural implements, pottery, carriages, and machinery are among the manufactures. Pop. 56,727.

Daventry, a borough, England, Northamptonshire. It has manufactures of whips and shoes. It contains a high-power station of the British Broadcasting Co. Pop. (1931), 3608.

David, King of Israel, the youngest son of Jesse, a citizen of Bethlehem, and descended through Boaz from the ancient princes of Judah. The life of David is recorded in the first and second books of *Samuel* and the first book of *Chronicles*.

David I (1084-1153), King of Scotland. He succeeded his brother, Alexander I, in 1124. He twice invaded England to support his niece Matilda against Stephen, her rival claimant for the English crown; during one of his incursions he was defeated at the battle of the Standard (1138). His services to the Church procured for him the popular title of saint, but the endowments so taxed the royal domains

and possessions that James VI bitterly characterized him as "ane sair sanct for the crown".

David II (1324–1371), King of Scotland, son of Robert Bruce by his second wife, Elizabeth de Burgh, succeeded to the throne 1329. On the death of his father he was acknowledged by the great part of the nation. Edward Baliol, however, the son of John Baliol, formed a party for the purpose of supporting his pretensions to the crown; he was backed by Edward III of England. After frequent battles David was made prisoner at Neville's Cross (1346). After being detained in captivity for eleven years he was ransomed for 100,000 merks.

David, Félicien César (1810–1876), French musician and composer. His most successful work was *Le Désert*. Other works are: *Moïse sur le Sinaï*, *Christophe Colomb*, *Le Paradis*, *La Perle du Brésil*, *Herculanum*, and *Lalla Roukh*. Bizet, Massenet, and Delibes were among his followers.

David, Jacques Louis (1748–1825), French painter. In the Revolution he was a violent Jacobin, and wholly devoted to Robespierre. Several of the scenes of the Revolution supplied subjects for his brush. What is considered his masterpiece, *The Rape of the Sabines*, was painted in 1799. He was appointed first painter to Napoleon about 1804.

David, Pierre Jean (1789–1856), French sculptor, born at Angers (hence commonly called *David d'Angers*). He executed a great number of medallions, busts, and statues of celebrated persons of all countries, among whom are Sir Walter Scott, Canning, Washington, Lafayette, Gutenberg, Cuvier, Victor Hugo, Béranger, Paganini, and Madame de Staël.

David, Saint (d. c. 601), patron of Wales, Archbishop of Caerleon, and afterwards of Menevia, now St. David's. His annual festival, known as St. David's Day, falls on the 1st of March.

David, capital of Chiriqui province, Panama. It lies in a fertile plain, and stock-raising and tobacco-culture are the main occupations. There is a good trade. Pop. 15,000.

Davidson, John (1857–1909), British poet. His first volume of verse, *In a Music Hall, and other Poems*, appeared in 1891. Other volumes are: *Fleet Street Eclogues* (1895); *New Ballads* (1896);

Testaments (1901–1902); *The Knight of the Maypole* (1902); *Holiday and other Poems* (1906); *Mammon and his Message* (1908); and *The Man Forbid, and other Essays* (1910).

Davidson, Randall Thomas (1848–1930), Archbishop of Canterbury. He was consecrated Bishop of Rochester in 1891, was translated to Winchester in 1895, and enthroned at Canterbury in 1903. He resigned in 1928, and was made a baron.

Davidson, Samuel (1806–1898), Irish Biblical scholar. His works include: *Introduction to the New Testament*; *Introduction to the Old Testament*; *Biblical Criticism*; translation of the *New Testament*, from Tischendorf's text; *Canon of the Bible*; and *Doctrine of the Last Things*.

Davies, Hubert Henry (1876–1917), British playwright. His plays include: *Mrs. Gorrings's Necklace* (1903), *The Mollusc* (1907), *Doormats* (1912), and *The Outcast* (1914).

Davies, Sir John (1569–1626), English poet and lawyer. In 1603 he was appointed Solicitor-General for Ireland, and soon after Attorney-General. He wrote: *Orchestra*; *Hymns to Astrea*; *Nosce Teipsum*, a metaphysical poem and his best-known work; he is also the author of a work on the political state of Ireland. Sir John Davies must be distinguished from John Davies of Hereford (?1565–1618), poet and writing master, and author of *Microcosmus* and *The Holy Rood*.

Davies, Sir Walford (1869–), British organist and composer. He was appointed organist to St. George's Chapel, Windsor, in 1927, and was professor of music in the University College of Wales at Aberystwyth from 1919 to 1926. His compositions include: *Hervé Riel* (1894), *Everyman* (1904), and *Heaven's Gate* (1917).

Davila, Enrico Caterino (1576–1631), Italian historian. He is principally celebrated for his *History of the Civil Wars of France from 1559 to 1598*.

Davis, Jefferson (1808–1889), President of the Confederate States of America during the Civil War. He was taken prisoner after the fall of Richmond, imprisoned for two years in Fortress Monroe, and set at liberty by the general amnesty of 1868. He subsequently wrote: *Rise and Fall of the Confederate Government*, and a *Short History of the Confederate States of America*. —Cf. F. H. Alfriend, *Life of Jefferson Davis*.

Davis, John (c. 1550–1605), English navigator. Between 1585 and 1587 he conducted three expeditions for the discovery of the north-west passage. He also accompanied the expedition of Cavendish to the Pacific from 1591 to 1593, and made several voyages to the East Indies.

Davis' Strait, a narrow sea which separates Greenland from Baffin Land, and unites Baffin Bay with the Atlantic Ocean.

Davos, an elevated valley, Switzerland, canton of Grisons, a winter-resort of persons suffering from chest diseases.

Davout, Louis Nicolas, Duke of Auerstädt and Prince of Eckmühl (1770–1823), French soldier. He received a marshal's baton in 1804, led the right wing at Austerlitz in 1805, and defeated the Prussians at Auerstädt in 1806. He shared the glory of Eylau, Eckmühl, and Wagram. During the Hundred Days (1815) he was Napoleon's Minister of War.

Davy, Sir Humphry (1778–1829), English chemist. He was appointed professor of chemistry in the Royal Institution at the age of twenty-four. He made important applications of the galvanic battery, decomposed the earths and alkalies and ascertained their metallic bases, and demonstrated the simple nature of oxy-muriatic acid (to which he gave the name of *chlorine*). His reputation among his contemporaries was very high. He did much work on agricultural chemistry and in investigating the harmful gases in fire-damp, but he is best known as the inventor of the safety-lamp. He was knighted in 1812, and created a baronet in 1818. In 1820 he succeeded Sir J. Banks as president of the Royal Society. His most important works are: *Philosophical Researches, Elements of Agricultural Chemistry, Electro-Chemical Researches, Elements of Chemical Philosophy, Researches on the Oxymuriatic Acid*, and *On Fire-damp*. He was author of *Salmonia*, or *Days of Fly-fishing*; and *Consolations in Travel*, or *the Last Days of a Philosopher*.

Dawes Plan. See *Ruhr*.

Dawkins, Professor Sir William Boyd (1838–1929), English geologist and archaeologist. His works include: *Cave Hunting*; *Early Man in Britain and his Place in the Tertiary Period*, a work throwing much light on prehistoric conditions in Britain; and *British Pleistocene Mammalia*.

Dawlish, a popular seaside resort, Devonshire, England. Pop. (1931), 4578.

Dawson, Sir John William (1820–1899), Canadian geologist. His published works include: *Acadian Geology*, *The Story of the Earth and Man*, *Science and the Bible*, *The Dawn of Life*, and *Geological History of Plants*.

Dawson, a Canadian city, capital of Yukon territory, at the junction of the Klondyke River with the Yukon. It owes its existence to the gold discoveries here, and was founded in 1896. The climate is subject to great extremes. Pop. 2000.

Dax, a town and watering-place of South-Western France, department of Landes, on the left bank of the Adour. The chief attraction of the place is its thermal springs, which are in great repute for the cure of rheumatic and similar complaints. It has a trade in turpentine, pit props, &c. Pop. 11,387.

Day, John (1574–1640?), English dramatist. His best works are: *Humour out of Breath*, a comedy; and *The Parliament of Bees*, a sort of masque.

Day, Thomas (1748–1789), British author. He wrote, in prose and verse, on various subjects, such as his poem *The Dying Negro*, but the *History of Sandford and Merton* and the *History of Little Jack* are the only works by which his name is perpetuated.

Day, either the interval of time during which the sun is continuously above the horizon, or the time occupied by a revolution of the earth on its axis, embracing this interval (the period of light) as well as the interval of darkness. The day in the latter sense may be measured in more than one way. If we measure it by the apparent movements of the stars, caused by the rotation of the earth on its axis, we must call a day the period between the time when a star is on the meridian and when it again returns to the meridian: this is a *sidereal day*. But more important than this is the *solar day*, or the interval between two passages of the sun across the meridian of any place. The latter is about 4 minutes longer than the former, owing to the revolution of the earth round the sun, and it is not of uniform length, owing to the varying speed at which the earth moves in its orbit and to the obliquity of the ecliptic. For convenience an average of the solar days is taken, and this gives us the *mean solar* or *civil day* of 24 hours. The difference between the *mean solar*, or *mean time*,

and actual solar, or *apparent* time, at any moment is called the *equation of time*. A sidereal day is equal to 23 hours, 56 minutes, 4.09 seconds of mean time.

The length of the days and nights at any place varies with the latitude and season of the year, owing to the inclination of the earth's axis. In the first place, the days and nights are equal (12 hours each) all over the world on the 21st of March and the 23rd of September, which dates are called the *vernal* (spring) and *autumnal equinoxes* (Lat. *aequis*, equal, *nox*, night). Again, the days and nights are always of equal length at the equator, but we find the seasonal variations in length of the day becoming greater and greater as we recede from the equator.

For astronomical and nautical, and, more recently, for meteorological purposes, the day has been divided as a whole into 24 hours instead of into two parts of 12 hours. The arrangement of commencing the astronomical day at noon is said to have been as old as the time of Ptolemy. In this method such a time (civil) as, say, 25th Oct., 4.30 a.m., is expressed as 24th Oct., 16 hours, 30 minutes. Its advantage is that all the records of observations taken during one night bear the same date, with a continuously increasing time; there is no break of continuity at midnight. There are, however, concurrent disadvantages, and frequent proposals were made to substitute a 24-hour reckoning commencing from midnight. This finally gained general acceptance among astronomers, and it was decided to introduce the new reckoning in the British Nautical Almanac as from 1st Jan., 1925. In meteorology the 24-hour system reckoning from midnight is employed, a plan which was also adopted for naval, military, and air-service use just before the close of the European War. In the future, therefore, one uniform method of expressing time will be used for all these and for astronomical purposes.

Day, in law, a period of time commencing at midnight and extending to 24 hours (*dies naturalis*), or the hours between sunrise and sunset (*dies artificialis*). By the Interpretation Act, 1889, any Act, Order, &c., expressed to come into operation on a particular day comes into operation immediately on the expiration of the preceding day.

Dayfly, the popular name of those

neuropterous insects, also called May-flies, which belong to the genus *Ephemera*. They are so called because in their perfect form they exist only from a few hours to a few days.

Daylight Saving, a system originated by William Willett, a London builder, which consists in arbitrarily putting forward the hands of the clock for one hour on a fixed day in spring, and setting them back on another fixed day in the autumn. The advantages are an increased use of daylight in place of artificial light, and the saving of many hours of work and of the cost of illumination. The Daylight Saving Bill, introduced into Parliament in 1907, failed to pass, as did similar Bills in 1909 and 1911. But in 1916 the House of Commons agreed to Daylight Saving as a provisional war measure, and clocks were put forward on 21st May. By an Act of 1925 it is ordained that Summer Time shall last from 2 o'clock in the morning of the day next following the third Saturday of April (if this is Easter Day, Summer Time comes in a week earlier) till 2 o'clock in the morning of the day next following the first Saturday of October.

Dayton, a town in Ohio, U.S.A., at the confluence of the Mad and Great Miami Rivers. It is a centre of railway and canal communication, and has machinery, cotton, and other manufactures. Pop. 165,530.

Deacon, a person in the lowest degree of holy orders. In the Roman Catholic Church the deacon is the chief minister at the altar. In the Church of England the deacon is the lowest of the three orders, these being bishops, priests, and deacons. The deacon may perform all the ordinary offices of the Christian priesthood except consecrating the elements at the administration of the Lord's Supper, and pronouncing the absolution.

Deaconess, a woman set apart for special service in the early Christian Church. The institution of deaconesses is based upon *1 Tim.* iii, 11. The order was revived in England by Bishop (afterwards Archbishop) Tait, who first formally ordained a deaconess in 1861. In 1897 the Lambeth Conference recognized the order, while repudiating all members not set apart by a bishop.

Dead-nettle, the common name of the species of plants of the genus *Lamium*,

nat. ord. Labiatae. There are several species found in Britain and in North America, as the white dead-nettle (*L. album*), the red (*L. purpureum*), and the yellow (*L. Galeobdolon*).

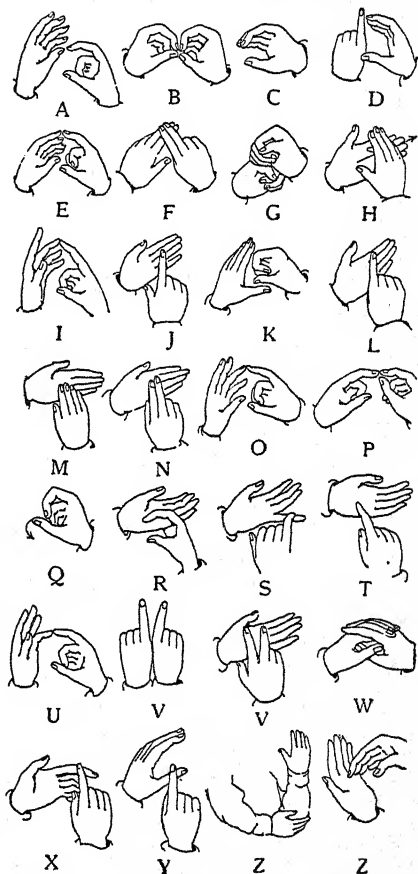
Dead Reckoning, the calculation of a ship's place at sea without any observation of the heavenly bodies. It is obtained by keeping an account of the distance which the ship has run by the log, and of her course steered by the compass, and by rectifying these data by the usual allowance for drift and leeway, according to the ship's known trim.

Dead Sea, called in Scripture 'Salt Sea', 'Sea of the Plains', and 'East Sea', a celebrated lake in Asia, near the south extremity of Palestine. The north extremity is 25 miles east of Jerusalem, and 10 miles south-east of Jericho; length, about 46 miles; breadth at the widest part, 9 to 10 miles. The basin in which the Dead Sea lies forms the south termination of the great depression through which the Jordan flows, that river entering it at its north extremity. It receives several other tributaries, but has no outlet. Its shores present a scene of indescribable desolation and solitude, encompassed by limestone cliffs, desert sands, and bleak, stony, salt hills. Sulphur and rock-salt, lava and pumice, abound along its shores. The water is nauseous to the taste and smell, and so buoyant that the human body will not sink in it. At about a third of its length from the north end it attains a maximum depth of 1808 feet. The southern portion is a mere lagoon, 12 feet deep in the middle and 3 feet at the edges. No animals exist in its waters. Asphalt and salt are collected in small quantities, and small steamers have been put on the lake.

Dead's Part, in Scots law, that part of a person's moveable (personal) estate of which the law allows unfettered testamentary disposal; that is, the portion of the moveable estate which remains after the legal claims of wife and children have been settled.

Deaf and Dumb, or **Deaf-mutes**, persons both deaf and dumb, the dumbness resulting from deafness which has either existed from birth or from a very early period of life. Such persons are unable to speak simply because they have not the guidance of the sense of hearing to enable them to imitate sounds.

The two chief methods of conveying instruction to the deaf and dumb are by means of the manual alphabet, and by training them to watch the lips of the teacher during articulation. This is called the oral method of teaching the deaf, and



Manual Alphabet of the Deaf and Dumb

it yields the best result, namely, the deaf are enabled to read the lips of their hearing brothers, who in turn are able to hear and understand the speech of the deaf.—Cf. T. Arnold, *Education of Deaf-mutes*.

Deafness, the partial or total inability

to hear. This is a symptom of most affections of the ear, and may be due to such simple causes as wax in the ear, or catarrh, when the condition is temporary. More often, however, it is due to a more serious condition, and no degree of deafness should be neglected. If taken in time, much can be done to stay the progress of certain forms of deafness, but when it arises from disease of the nerve of hearing, treatment can do little. The onset is usually sudden and the progress rapid.

Deák, Franz (1803–1876), Hungarian statesman. At the Revolution of 1848 he became Minister of Justice, but retired when Kossuth obtained power. He is regarded as the master-spirit of the movement by which the independence of his country was restored in 1867.

Deal, a seaport and watering-place in Kent, England, between the North and South Foreland. Boat-building and sail-making are carried on. Pop. (municipal borough), (1931), 13,680.

Deal, the division of a piece of timber made by sawing; a board or plank. The name deal is chiefly applied to boards of fir above 7 inches in width and of various lengths exceeding 6 feet. If 7 inches or less wide, they are called *battens*, and when under 6 feet long, they are called *deal-ends*. The usual thickness is 3 inches, and width 9 inches. In North America the standard size, to which other sizes may be reduced, is 2½ inches thick, 11 inches broad, and 12 feet long. *Whole deal* is deal which is 1½ inches thick; *slit deal*, half that thickness. Deals are exported from Prussia, Sweden, Norway, Russia, and British North America.

Deal-fish. See *Ribbon-fishes*.

Dean, an ecclesiastical dignitary. *Deans of chapters* are governors over the canons in cathedral and collegiate churches. The *dean and chapter* are the bishop's council to aid him with their advice in affairs of religion and in the temporal concerns of his see, and the property of the cathedral is vested in them as a corporation, the dean being himself a 'corporation sole'. *Rural deans* are benefited clergymen appointed by the bishop or archdeacon to exercise a certain supervision over the clergy and ecclesiastical affairs in districts of a diocese.

Dean, Forest of, England, county of Gloucester. The present area is about

22,000 acres. It was formerly appropriated for the growth of navy timber, but is now mainly covered with coppices. This district is Crown property, and the inhabitants (chiefly coal- and iron-miners) enjoy many ancient privileges.

Death Duties, duties or charges payable to the Crown on property passing at death. They are now Estate Duty, Legacy Duty, and Succession Duty; but are not levied on estates not exceeding £100 gross value. Further, if the net value does not exceed £1000 and estate duty has been paid, the remaining duties are not exigible. Estate duty, first imposed in 1894, is payable on the market value of the property, real or personal, passing on the death of any person, according to a scale now rising from 1 per cent on estates between £100 and £500 to 50 per cent on estates exceeding £2,000,000. On small estates exceeding £100 but not £300, and exceeding £300 but not £500, gross value, fixed duties of 30s. and 50s. respectively may be paid in lieu of the *ad valorem* duty. Estate duty is not payable on the property of common seamen, marines, soldiers, and airmen who die in His Majesty's service. The net annual yield from these duties generally exceeds £70,000,000. By the Death Duties (Killed in War) Act, 1914, and the Finance Acts, 1918 and 1919, special provisions are made where death occurred either on active service or as a result of wounds received.

Death's-head Moth, the largest British species of lepidopterous insects, *Acherontia atropos*, measuring from 4 to 5 inches. It has peculiar skull-like markings on the throat, and has a peculiar squeaking mouse-like cry. It attacks bee-hives, pillages the honey, and disperses the inhabitants. It is regarded by the superstitious as the forerunner of death or other calamity.

Death-watch, the popular name of two minute beetles of the genus *Anobium*, which live in and destroy woodwork. In calling to one another they strike their heads against the wood, making a peculiar ticking sound.

Debenture, a deed-poll (declaratory deed) given by a public company in acknowledgment of borrowed money. It gives the holder the first claim for dividends, while the capital sum lent is usually assured on the security of the whole undertaking. With the deed, coupons or

warrants for the payment of interest at specified dates are generally issued. Debentures may be divided into two main classes: debentures payable to the registered holder, and debentures payable to bearer. In some cases the debentures are to bearer with an option to convert them into registered debentures, if the holders so desire. Debentures to bearer of a British company are negotiable, unless there is some condition in the debenture itself which restricts its negotiability. Custom-house certificates of drawback are also termed debentures.

Debreczen, a town of Hungary, on the edge of the great central plain. There is a university founded in 1912. Chief manufactures are coarse woollens, leather, soap, tobacco-pipes, wine, and casks, and a large trade is done in cattle. Debreczen is considered the head-quarters of Hungarian Protestantism. Pop. 103,186.

Debt, in English law, an ascertained sum of money owed by one person (debtor) to another (creditor). Right of action on a simple debt lapses after six years. The running of the period of prescription is interrupted by subsequent written admission of indebtedness, payment to account, or payment of interest.

Debussy, Claude Achille (1862-1918), French musical composer. His best-known works are the opera *Pelléas et Mélisande* (1902), and *L'Après-midi d'un Faune*, the first of which marked him as a leader of the new French school of music. Other works are: *La Mer* (1905); *Jeux*, a ballet (1913); *Crimen Amoris*, a ballet (1914); *Chimène*; and *Le Diable au Beffroi*.

Decalogue, the ten commandments which were given by God to Moses on two tables. The Decalogue has come down to us in two versions which differ to a considerable extent, one (in common use) being in *Exod.* xx, the other in *Deut.* v. Jews and Christians have divided the ten commandments differently; and in some Catholic catechisms the second commandment has been united with the first, and the tenth has been divided into two.

Decamps, Alexandre Gabriel (1803-1860), French painter. The best known of all his works is *The Monkey Connoisseurs*.

De Candolle, Augustin Pyrame (1778-1841), French botanist. His chief works are: *L'Histoire des Plantes Grasses*, *Regni*

Vegetabilis Systema Naturale (incomplete), *Théorie Élémentaire de Botanique*, *Organographie Végétale*, *Physiologie Végétale*, and *Prodromus Systematis Naturalis*.

Decapoda. (1) The highest order of crustaceans, divided into Brachyura, the short-tailed decapods or crabs; Macrura, including the shrimp, lobster, prawn, and crayfish; and Anomura, of which the hermit-crab is an example. (2) One of the two divisions of the dibranchiate cuttle-fishes (the other being the Octopoda).

Decapolis, a district of ancient Palestine containing ten cities, including Damascus and Gadara.

Decatur, a city and important railway centre of Illinois, U.S.A. It has a large rolling-mill and several woollen-factories, and is a place of considerable trade. Pop. 43,818.

Decazeville, a town of France, department of Aveyron, with coal- and iron-mines and large ironworks. Pop. 14,000.

Deccan, a term locally limited to the territory of India lying between the Nerbada and the Kistna, but generally understood to include the whole country south of the Vindhya Mountains, thus comprising the Presidency of Madras and part of Bombay, Hyderabad, Mysore, Travancore, and other native states.

Deceased Wife's Sister, Marriage with, a union that was made lawful in the United Kingdom by an Act of 1907. Such marriages had been legalized in the Australian colonies and Canada before this. A later Act of 1921 has the corresponding effect shown by its title, *The Deceased Brother's Widows Marriage Act*.

Decimal System. See *Metric System*.

Decius, Gaius Messius Quintus Trajanus (201-251), Roman emperor. He came to the throne in 249, persecuted the Christians, and perished with his army in a battle near Abritum against the Goths.

Declaration, a simple affirmation substituted in lieu of an oath, solemn affirmation, or affidavit, which English law allows in a variety of cases, and which is usually made before a justice of the peace or other authorized person.—*Declaration of Independence*, the solemn declaration of the Congress of the United States of America, on 4th July, 1776, by which they formally renounced their subjection to the Government of Britain.—*Declaration of London*, a code drawn up

in 1909 by the Powers for the use of an International Prize Court at The Hague, to which great objections were taken at the time in Great Britain, as tending to destroy the maritime power of the country. —*Declaration of Paris*, an instrument signed at the Congress of Paris, 1856, and subsequently accepted by the chief Powers. It declared (1) privateering to be abolished; (2) a neutral flag covers enemy's goods, with the exception of contraband of war; (3) neutral goods, except contraband of war, are not liable to capture under an enemy's flag; and (4) blockades, in order to be binding, must be effective.

Declination, in astronomy, the distance of a heavenly body from the celestial equator (equinoctial), measured on a great circle passing through the pole and also through the body. Declination corresponds to terrestrial latitude. Declination and right ascension specify the position of a point on the celestial sphere, as do latitude and longitude on the terrestrial. Declination of the compass needle, or *magnetic declination*, is the variation of the magnetic needle from the true meridian of a place (see *Terrestrial Magnetism*). This is different at different places, and at the same place at different times. The declination at London was $11^{\circ} 15'$ E. in 1576, $16^{\circ} 19'$ W. in 1903, and $14^{\circ} 8'$ W. in 1920.

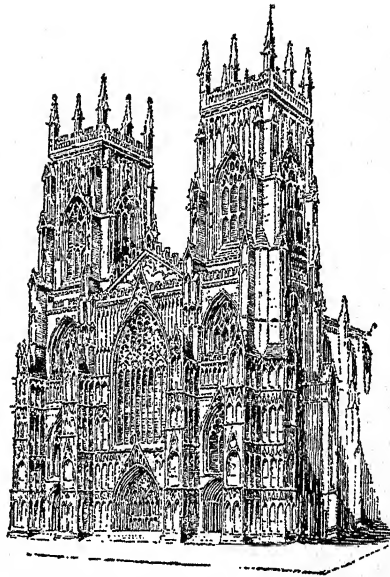
Decorated Style, in architecture, the second style of pointed (Gothic) architecture, in use in Britain from the end of the thirteenth to the beginning of the fifteenth century, when it passed into the Perpendicular. The Decorated style has been divided into two periods, viz. the *Early* or *Geometrical Decorated* period, in which geometrical figures are largely introduced in the ornamentation; and the *Decorated style* proper, in which the peculiar characteristics of the style are exhibited.

Decree, in general, an order, edict, or law made by a superior as a rule to govern inferiors. In law it is a judicial decision or determination of a litigated cause, though the word *judgment* is now used for decisions of the supreme court. The word is still used in Scotland for the final judgment of a court, frequently in the form *decree*.

Decree Nisi, literally a 'decree unless', in England, is the decree of divorce issued by the court on satisfactory proof

being given in support of a petition for dissolution of marriage; it remains imperfect for at least six months, and is then made absolute, 'unless' sufficient cause is shown why it should not be made so.

Decretals, a general name for the Papal decrees, comprehending the rescripts (answers to inquiries and petitions), decrees (judicial decisions by the *Rota Romana*), mandates (official instructions for ecclesiastical officers, courts, &c.), edicts (Papal ordinances in general), and general resolutions of the councils. The decretals form a most important portion of the Roman Catholic canon law, the authoritative collection of them being that made by St. Raymond of Penafort, by the orders of Gregory IX, and published in 1234. The False Decretals were a collection of letters ascribed to various Popes,



Decorated Style—York Cathedral, West Front

and used as a basis for canon law. The collection appeared about A.D. 850. For some time they were accepted in all good faith as genuine, until Nicholas of Cusa (died 1464) and other scholars, including Cassander and Erasmus, rejected them as spurious.

Dédéagatsh, a small seaport of Greece, on the Ægean Sea, connected by rail with Constantinople, Burgas, and Salonica. The anchorage (18 to 24 feet) is about a mile off shore. The trade is in cereals, wool, tobacco, and cattle.

Dee, John (1527–1608), English mathematician, alchemist, and astrologer. In 1581, along with a man named Kelly, he visited several of the Continental courts, pretending to raise spirits. In 1595 he obtained from Queen Elizabeth the wardenship of Manchester College. He left behind him many works, partly of a scientific character, partly dealing with the occult sciences and invocation of spirits.—Cf. Charlotte Fell-Smith, *Life of Dr. John Dee*.

Dee, the name of several British rivers.—(1) A river of Scotland, partly in Kincardineshire, but chiefly in Aberdeenshire, one of the most finely wooded and one of the best salmon rivers in Britain. It rises on the south-west border of Aberdeenshire, and flows generally eastward 87 miles to the North Sea, having Aberdeen at its mouth. (2) A river in North Wales and Cheshire. It rises in Lake Bala, Merionethshire, and flows to the Irish Sea; length, about 80 miles. (3) A river of Scotland, county of Kirkeudbright. It rises in Loch Dee, and flows into Kirkeudbright Bay; length, 38 miles.

Deed, in law, a writing under seal which in English law imports consideration to support a promise. By the Law of Property Act, 1925, all deeds must be signed. A deed is either an *indenture* or a *deed-poll*, the former being made between two or more parties in different interests, the latter by one person or two or more persons in the same interest.

Deeg, a town and fortress in Bhutpore, Central India, situated in the midst of marshes, and almost surrounded by water during a great part of the year. At the south-west corner is a lofty rock on which the citadel stands. Pop. 15,828.

Deer, a general name for the ungulate or hoofed ruminating animals constituting the family Cervidae, of which the typical genus is *Cervus*, the stag or red-deer. The distinguishing characteristics of the genus are that the members of it have solid branching antlers which they shed every year, and eight cutting-teeth in the lower jaw and none in the upper. In reindeer antlers are possessed by both sexes.

They are used as defensive and offensive weapons, and grow with great rapidity. There are many species of deer, as the red-deer or stag, the fallow-deer, the roe-buck, the reindeer, the moose, the elk, the axis, rusa, muntjac, wapiti, &c. Deer



Stag

are pretty widely distributed over the world, though there are none in Australia or in Africa.

Deer, Old, a village and parish of Scotland, in the Buchan district of Aberdeenshire, interesting as an early seat of Christianity, a religious house having been established there by St. Columba about 580. There is a manuscript still in existence, called the *Book of Deer*, which belonged to the monastery, and which contains the earliest specimens of Scottish Gaelic known. The MS. itself is in Latin, and contains St. John's Gospel and parts of the others, &c., the Gaelic being entries, of little importance in themselves, written in blank portions of the book.

Defamation, the publication to a third person, without just excuse, of untrue words or symbols which in fact tend to bring some other person into hatred, contempt, or ridicule. Just excuse arises where there is a duty to make the communication, e.g. a master giving the character of his former servant to a prospective employer.

Default, in law, signifies generally any neglect or omission to do something which ought to be done. Its special application is to the failure of a party to legal proceedings to take some required step within the time appointed for it.

Defeasance, in English law, a deed collateral to and executed at the same time as another or principal deed, and embodying certain conditions on the occurrence of which the operation of the principal deed is annulled or 'defeated'. In Scots law, a legacy which vests in a person subject to his being divested on the occurrence of an uncertain event is said to vest 'subject to defeasance'.

Defence, generally, is the answer the defendant has to the claim or charge against him. Technically it denotes the written pleading of the defendant in answer to the statement of claim. It must deal specifically and substantially with each allegation of fact therein of which the truth is not admitted. It must not be argumentative, irrelevant, evasive, or embarrassing, and the Court on these grounds may make the defendant liable to the penalties of default in pleading.

Defence of the Realm Acts, a term under which all the statutes and regulations enacted in 1914 and afterwards to meet the emergencies of the European War are known.

Defender of the Faith (*Fidei Defensor*), a title belonging to the King of England. Leo X bestowed the title of *Defender of the Faith* on Henry VIII in 1521, on account of his book against Luther, and the title, confirmed to Henry by Parliament in 1544, has been used by the sovereigns of Great Britain ever since.

Deffand, Marie de Vichy-Chamrond, Marquise du (1697-1780), a celebrated Frenchwoman. During the latter part of her long life she became the centre of a literary coterie which included Choiseul, Boufflers, Montesquieu, Voltaire, D'Alembert, David Hume, and Horace Walpole. Her correspondence has been several times republished.

Defoe, Daniel (c. 1659-1731), English author. In 1685 he joined the insurrection of the Duke of Monmouth, and had the good fortune to escape; after which he made several unsuccessful attempts at business, and at last turned his attention to literature. In 1701 appeared his satire in verse, *The True-born Englishman*, in

favour of William III. As a zealous Whig and Dissenter he was frequently in trouble. For publishing *The Shortest Way with the Dissenters* (1702) he was pilloried and imprisoned in Newgate. In 1705 he wrote a short account of the *Apparition of Mrs. Veal*, a fictitious narrative accompanying a translation of Drelinecourt, *On Death*. In 1719 appeared the most popular of all his works, *The Life and Surprising Adventures of Robinson Crusoe*, the favourable reception of which was immediate and universal. The success of Defoe in this work of fiction induced him to write a number of other lives and adventures in character, as *Moll Flanders*, *Captain Singleton*, *Roxana*, *Duncan Campbell*, *The Memoirs of a Cavalier*, and *Journal of the Plague Year*. After the accession of George I he was employed by the Government in some underhand work connected with the Jacobite press, and was a prolific contributor to periodical and ephemeral literature.—**BIBLIOGRAPHY**: William Minto, *Daniel Defoe* (English Men of Letters Series); Thomas Wright, *Life of Daniel Defoe*.

Deforcement, in law, the holding of lands or tenements to which another person has a right; a general term including any species of wrong by which he who has a right to the freehold is kept out of possession. In Scots law, it is the resisting of an officer in the execution of law.

Dégas, Hilaire Germain Edgard (1834-1917), French painter. He became known as one of the foremost French genre painters. Among his best-known works are: *Race Horses*, *Ballet Girls*, and *Les Blanchisseuses*.

Degeneration, in biology, simplification of structure, in adaptation to modes of life where complexity is less necessary. It is exemplified by numerous parasitic plants, such as the dodder (*Cuscuta*), which feeds by absorbing the juices of clover and other forms. Here the roots have disappeared, the leaves are reduced to minute scales, and there is an entire absence of the green colouring-matter (chlorophyll) essential to non-parasitic plants. There are still more striking cases among animals. Tapeworms, for instance, live in the intestines of various vertebrates, and feed by absorbing the digesting food that surrounds them. Striking degeneration may be associated with the fixed or sedentary mode of life,

as in the sea-squirts or ascidians, lowly members of the vertebrate sub-kingdom.

Deggendorf, a town, Lower Bavaria, on the Danube, 29 miles north-west of Passau. It has manufactures of linen, paper, and woollens. Its Church of the Holy Sepulchre is visited by about 30,000 pilgrims each year. Pop. 7000.

Degree, in geometry or trigonometry, the chief practical unit used in the measurement of angles. A right angle contains 90 degrees, or, as it is usually written, 90°. The degree is divided into 60 minutes, and the minute into 60 seconds. The unit angle used in theoretical work is the *radian*. The relation between this and the degree is given by the equation π radians = 180°, where π is the ratio of the circumference of a circle to its diameter, the approximate value of which is 3.14159. See *Latitude*; *Longitude*; *Heat*.

Degree, in universities, a mark of distinction conferred on students, members, or distinguished strangers, as a testimony of their proficiency in the arts or sciences, or as a mark of respect, the former known as full, the latter as honorary degrees. The degrees most commonly given are: B.A., M.A., B.Litt., D.Litt., B.Sc., M.Sc., D.Sc., M.B., M.D., B.Ch., M.Ch., B.L., LL.B., LL.D., B.D., D.D. or S.T.P., Mus.Bac., Mus.M., Mus.Doc., Ph.D. See *Abbreviations*.

Dehra, a town of India, capital of Dehra Dun, with military cantonments, and churches and missions of several denominations. Pop. 38,610.

Dehra Dun, a fertile valley in the Meerut division of the United Provinces, India. About a third of its area is a forest reserve. The chief products are wheat, rice, barley, tea, and oil-seeds. Area, 1193 sq. miles; pop. about 200,000.

Deism, a philosophical system which, as opposed to *Atheism* (Gr. *a*, not, and *Theos*, God), recognizes a great First Cause; as opposed to *Pantheism* (Gr. *pan*, all, *Theos*), a Supreme Being distinct from nature or the universe; while, as opposed to *Theism*, it looks upon God as wholly apart from the concerns of this world. It thus implies a disbelief in revelation, scepticism as regards the value of miraculous evidence, and an assumption that the light of nature and reason are the only guides in doctrine and practice. In the eighteenth century there was a series of writers who are spoken of dis-

tinctively as the English deists. They include John Toland, Anthony Collins, and Matthew Tindal.—Cf. Sir Leslie Stephen, *History of English Thought in the 18th Century*.

Dekker, or **Decker**, Thomas (1570–1641), English dramatic and miscellaneous author. All that we know of his life is that he was constantly in prison for debt, and that he endured toil and hardship cheerfully. He was a Londoner through and through, and in that and many other respects resembled Dickens. His best plays are *The Shoemaker's Holiday* and *Old Fortunatus*. As Charles Lamb said, "Dekker had poetry enough for anything", and as well as this gift of poetry he had a gift of realism, the two making a striking combination. Besides being a poet, he was a clever pamphleteer, and his *Gull's Hornbook* is one of the most entertaining and lively Elizabethan prose tracts. When he crossed swords with Jonson in *Satiromastix*, his skillfully manipulated rapier was more than a match for Jonson's two-handed engine.

Delacroix, Ferdinand Victor Eugène (1798–1863), French painter. His chief pictures are: *Dante and Virgil in the Infernal Regions*, *The Murder of the Bishop of Liège*, *The Jewish Marriage*, and *Moorish Soldiers at Exercise*.

Delagoa Bay, in Portuguese East Africa, a large sheet of water partly separated from the Indian Ocean by the Peninsula and Island of Inyack. The outer bay, 26 miles long by 22 miles broad, opens to the inner harbour (7 miles by 1 mile) by a passage half a mile across. Beyond this lies Lourenço Marques (q.v.). There is accommodation for large vessels. Delagoa Bay is of great strategic and commercial importance.

De La Mare, Walter (1873–), English poet and writer of prose romances. His works include *The Return* (novel), *The Listeners*, *Peacock Pie*, and *Come Hither* (anthology).

Delambre, Jean Baptiste Joseph (1749–1822), French astronomer. He was engaged with Méchain from 1792 till 1799 in measuring an arc of the meridian from Barcelona to Dunkirk. His chief work is *Traité d'Astronomie Théorique et Pratique*.

Delane, John Thaddeus (1817–1879), British journalist. He became editor of *The Times* in 1841, and retained that post till 1877, during which time that paper

attained an almost unparalleled influence and a great circulation.

Delarocbe, Hippolyte (familiarily styled Paul (1797-1856), French painter. His subjects are principally taken from French and English history. Among others may be mentioned: *The Death of Queen Elizabeth*, *The St. Bartholomew Massacre*, *Charles I mocked by his Guards*, and *The Execution of Lady Jane Grey*. He held a middle place between the classical and the romantic schools, and was regarded as the leader of the so-called 'eclectic school'.

Delavigne, Jean François Casimir (1793-1843), French poet and dramatist. He produced in 1819 his tragedy of *Les Vêpres Siciliennes*; *Les Comédiens* appeared in 1820, and the tragedy of *Le Paria* in 1821. Of his other plays which followed these may be mentioned: *L'Ecole des Vieillards*, *Marino Faliero*, and the dramas of *Louis XI* and *Don Juan d'Austriche*.

Delaware, a river of the U.S.A., which rises in the Catskill Mountains in New York, and flows to Delaware Bay. It has a course of about 300 miles, and is navigable for large vessels to Philadelphia.

Delaware, one of the original thirteen States of the United States of America. It is bounded north by Pennsylvania, east by the Delaware River and Bay and by the ocean, south and west by Maryland; area, 2370 sq. miles. In the south and towards the coast the surface is very level, but the north part is rather hilly. An elevated swampy tableland towards the west traverses the state, forming the watershed between the Bay of Chesapeake and the Delaware. 85 per cent of the land is under cultivation. Fruit cultivation (peaches, apples, berries) is largely engaged in, and the canning and drying of fruits are important industries. There are also extensive and varied manufactures. A ship canal connects Chesapeake River and Delaware Bay. There are over 300 miles of railway. Wilmington is the chief manufacturing and commercial town. The capital is Dover. Pop. 223,003, including 30,000 negroes.

Delaware, a city in Ohio, U.S.A., a place of considerable trade; the seat of the Ohio Wesleyan University. There are celebrated medicinal springs in the vicinity. Pop. 9076.

Delaware Bay, an estuary or arm of

the sea between the states of Delaware and New Jersey, U.S.A. At the entrance, near Cape Henlopen, is situated the Delaware Breakwater, which affords vessels a shelter within the cape.

Delaware Indians. See *Indians, American*.

Delcassé, Théophile (1852 - 1923), French statesman. He was Foreign Minister in the Brisson Cabinet in 1898, and retained his office for seven years, during which France passed through various crises, such as the Fashoda affair, the Dreyfus case, and the separation of Church and State. As Foreign Minister Delcassé was one of the founders of the Anglo-French Entente. When the Morocco crisis broke out in 1905, he was compelled to resign. From 1905 to 1912 he was Minister of Marine.

Del Credere Commission, additional commission paid by a principal to his agent, in consideration of which the agent guarantees fulfilment of the contracts into which he enters on his principal's behalf.

Delfshaven, a town of Holland, on the Maas, a suburb of Rotterdam. It has ample accommodation for shipping. It was at Delfshaven that the Pilgrim Fathers embarked for America on 22nd July, 1620.

Delft, a town, Holland, 8 miles north-west of Rotterdam, intersected in all directions by canals. Delft was formerly the centre of the manufacture of the pottery called *delft-ware*; its chief industries now are carpets, leather, soap, oil, and gin. Pop. 47,819.

Delfzijl, a seaport, North Holland, on the Ems estuary. Steamers drawing 26 feet can safely enter the harbour at high water. The exports are straw, moss litter, potato flour, and other agricultural products. Pop. 10,000. There is a canal joining Delfzijl and Groningen.

Delhi, a city of India, in Delhi province (see below), anciently capital of the Pathan and Mogul Empires. Since 1912 capital of the Indian Empire and seat of government. It was at one time the largest city in India, and a vast tract covered with ruins marks the extent of the ancient metropolis. The present city abuts on the right bank of the Jumna. Amongst the many fine buildings are the palace of the Great Mogul ('the fort') and the Jamma Musjid or Great Mosque, both built by Shah Jehan in the seventeenth century. The industries in-

clude cotton-spinning, flour-milling, sugar-refining, and the manufacture of jewellery, pottery, and silver, brass, and copper wares. During the Mutiny Delhi was seized by the rebel sepoys, who made it the centre of their operations until it was captured by Generals Wilson and Nicholson. In 1912 it was decided to make Delhi the capital of India, and on a site to the south of the city New Delhi has been built—a modern city with magnificent buildings, chief of which are the Council House (opened in 1927), Government House, and two secretariat buildings. It was planned by Sir Edwin Lutyens. Pop. 304,420.—The province of Delhi was constituted in 1912, and consists of a small enclave in the Punjab. Area, 593 sq. miles; pop. 488,000.—BIBLIOGRAPHY: G. Festing, *When Kings rode to Delhi*; G. W. Forrest, *Cities of India*.

Delibes, Léon (1836–1891), French composer. His first important dramatic work was *Le roi l'a dit*. Other works are the operas *Jean de Nivelle* and *Lakmé*; the latter, produced in 1883, is his most popular opera.

Delille, Jacques (1738–1813), French didactic poet. His reputation, which declined very much after his own day, mainly rests on his translation of the *Georgics*, and on *Les Jardins*, a didactic poem.

Delirium, a temporary disordered state of the mind, accompanied by senseless rambling and incoherent speech. It may be the effect of direct injury or disordered or inflammatory action affecting the brain itself, or of a very high temperature; it may be caused by long-continued and exhausting pain.

Delisle, Joseph Nicolas (1688–1768), French astronomer, geographer, and mathematician. His chief work was *Mémoires pour servir à l'Histoire de l'Astronomie, de la Géographie et de la Physique*.

Delitzsch, Franz (1813–1890), German Protestant theologian and Hebrew scholar. He exerted himself in connexion with the conversion of the Jews, and translated the New Testament into Hebrew.

Delitzsch, Friedrich (1850–1922), German Assyriologist, son of the preceding. Lectures delivered by him in 1902 and 1903, entitled *Babel und Bibel*, gave rise to much controversy.

Delitzsch, a town of Prussian Saxony, 15 miles north of Leipzig, with industries

connected with tobacco, sugar, shoes, brewing, and milling. Pop. 13,031.

Delius, Frederick (1863–), British musical composer. He has written several operas (*Koanga*, *Romeo and Juliet in the Village*, and *Fennimore and Gerda*). He has also composed *Sea Drift*, *Requiem*, and numerous other works for chorus and orchestra; concertos for the piano, the violin, and the 'cello, and a string quartet. He received the C.H. in 1929.

Della Cruscans, a coterie of English poetasters who were extinguished by the bitter satire of Gifford's *Baviad* (1794) and *Mæviad* (1796). Mrs. Piozzi, Boswell, Merry, Cobb, Holcroft, Mrs. H. Cowley, and Mrs. Robinson were the leaders. They took the name from the Accademia della Crusca in Florence.

Della Robbia, Luca (1400–1482), Italian sculptor. He was distinguished for his work both in marble and bronze, and also for his reliefs in terra-cotta coated with enamel, a kind of work named after him.

Dellys, a seaport of Algeria. The climate is salubrious, and there is a trade in grain, oil, and salt. There is good anchorage in 10 fathoms half a mile from the shore. Pop. 13,620.

Delorme, Jean Louis (1740–1806), Swiss writer. He became known by his *Constitution de l'Angleterre*. Delorme also published in English his *History of the Flagellants*, or *Memorials of Human Superstition* (1783); and *An Essay on the Union with Scotland* (1796).

Delorme, Marion (1613–1650), French courtesan. Her beauty and wit soon made her house the rendezvous of all that was gallant and brilliant in Paris. The legend is current in France that her death and funeral was a mere pretence, and that she lived to the age of 129. Victor Hugo has taken her as the subject of one of his dramas. Alfred de Vigny described her fate in his novel *Cinq-Mars*.

Delos, an island of great renown among the ancient Greeks, fabled to be the birth-place of Apollo. It was a centre of his worship, and the site of a famous oracle. It is the central and smallest island of the Cyclades, in the Ægean Sea, a rugged mass of granite about 12 sq. miles in extent. It was once the centre of a rich commerce (under the Corinthians), but is now uninhabited. Archæological excavations have been going on since 1877.

Delphi, an ancient Greek town, the seat of the famous oracle of Apollo, was situated in Phocis, on the southern side of Parnassus. The oracles were delivered by the mouth of a priestess, and were always obscure and ambiguous; yet they served, in earlier times, in the hands of the priests, to regulate and uphold the political, civil, and religious relations of Greece. The site of the town is now occupied by a village called *Castri*. Excavations have been made here, and monuments discovered since 1880.

—Cf. L. R. Farnell, *Cults of the Greek States*.

Delta, the name of the Greek letter Δ, answering to the English D. The island formed by the alluvial deposits between the mouths of the Nile, from its resemblance to this letter, was named Delta by the Greeks; and the same name has since been extended to those alluvial tracts at the mouths of great rivers which, like the Nile, empty themselves into the sea by two or more diverging branches.

Delta-Amacuro, a territory of Venezuela; capital, Tucupita. The population is 13,474.

Deluc, Jean André (1727–1817), Swiss geologist and meteorologist. Among his numerous writings are his *Recherches sur les Modifications de l'Atmosphère*, *Nouvelles Idées sur la Météorologie*, *Lettres sur le Christianisme*, and his *Traité élémentaire de Géologie*.

Delundung, the local name of species of *Prionodon*, native to South-East Asia, and belonging to the civet-cat family.

Delvino, a town of Albania, about 44 miles north-west of Janina; it has some trade in olive-oil. Pop. about 8000.

Demand and Supply, terms used in economics to express the relations between the demand of purchasers and the supply of commodities by those who have them to sell. The relations between the two determine exchange value, i.e. the price. When the demand exceeds the supply, the price is raised; when the supply exceeds the demand, prices fall. The terms are, however, only a convenient means for dividing into two groups the forces determining value. Over short periods these are almost endless; over long periods cost of production is the ruling influence, and this in relation to price in turn directs supply.

Demavend, a volcanic mountain of Persia, and the highest peak of the Elburz chain. Its height is about 19,400 feet.

Dembea, a lake of Abyssinia, in the west part of that country. It is of irregular form, about 140 miles in circumference, and forms the reservoir of the Blue Nile.

Dementia. See *Insanity*.

Demerara, a division of British Guiana, which derives its name from the River Demerara. The river is navigable for about 90 miles, though at low tide it is obstructed by a bar.

Dēmētēr, one of the twelve principal Grecian deities, the great mother-goddess, the nourishing and fertilizing principle of nature. She was the daughter of Cronus and Rhea, and mother of Persephōnē (Proserpine). She was called Ceres by the Romans.

Demetrius, surnamed *Poliorecētēs* (the besieger of cities) (c. 339–283 B.C.), king of ancient Macedonia. He conquered Macedonia (294 B.C.) and reigned seven years, but lost this country, was imprisoned by Seleucus, and died in Syria.

Demetrius Phalereus (c. 345–283 B.C.), Greek orator and statesman. He fled to Egypt when Athens, of which he was governor, was taken by Demetrius Poliorcetes. The work on rhetoric, *Peri Hermēneias* (On Style), which has come to us under his name, belongs to a later age.

Demmin, an old town of Prussia, province of Pomerania, with manufactures of machinery, bells, woollen and linen cloth, hats, leather, hosiery, and tobacco; and a good trade. Pop. 12,378.

Democracy, in political science, as contrasted with aristocracy or autocracy, is the rule of a people by itself, either directly or by means of representatives. In the city-states of Greece, the citizens were regularly called together for legislative or other purposes, and voted directly on any issue, the system being made workable by citizenship being restricted to a limited number. This method of democratic government became impracticable with the growth of imperial and nation-states; and after a phase of government by one man or a small group of men, the method of representation developed. The system first took workable shape in England, and her parliamentary system has inspired the Constitutions of the United States, of all British colonies, and of many European states.—BIBLIOGRAPHY: Sir H. Maine, *Popular Government*; T. E. May, *Democracy in Europe*; J. Holland Rose, *The Rise of Democracy*.

Democrat, in the United States, a member of one of the two great political parties into which that country is divided, in contradistinction to *Republican*. The party stands mainly for decentralization and self-government of the states, as opposed to an increase in the power of the Federal (Central) Government.

Democritus (c. 460–370 B.C.), Greek philosopher of the new Eleatic school. According to later biographers he was called 'the Laughing philosopher', from his habit of laughing at the follies of mankind. His importance, however, lies in his being the pioneer of materialism and the mechanical explanation of the universe. His system of philosophy is known as the atomic system. In this system he developed still further the mechanical or atomical theory of his master Leucippus. Thus he explained the origin of the world by the eternal motion of an infinite number of invisible and indivisible bodies or atoms, which differ from one another in form, position, and arrangement, and which have a primary motion, which brings them into contact, and forms innumerable combinations, the result of which is seen in the productions and phenomena of nature. In this way the universe was formed, fortuitously, without the interposition of a First Cause.

Demoiselle. (1) The Numidian crane (*Anthropoides virgo*), ranging from South Europe through Turkestan and Siberia to China, and visiting Africa in the winter. (2) Small and graceful dragon-flies of the genus *Calopteryx*.

De Moivre, Abraham (1667–1754), French mathematician. He settled in London after the revocation of the Edict of Nantes. *De Moivre's Theorem* is a fundamental result in analytical trigonometry. His chief works are: *Miscellanea Analytica*; *The Doctrine of Chances*, or *a Method of Calculating the Probabilities of Events at Play*; and *A Treatise on Annuities*.

Demon, a spirit or immaterial being of supernatural but limited powers, especially an evil or malignant spirit. A belief in demons is found in the oldest religions of the East. Buddhism reckons six classes of beings in the universe: two, gods and men, are accounted good; the other four are malignant spirits. The Persians and the Egyptians had also a complete system of demons; and in Europe, up till the

Middle Ages, the divinities of Oriental, classical, and Scandinavian mythology often figure, from the Christian point of view, as evil spirits.

De Morgan, Augustus (1806–1871), English mathematician and logician. He was professor of mathematics at London University for over thirty years. His writings are very numerous, and include: *Elements of Arithmetic, Algebra, and Trigonometry*; *Essay on Probabilities and on their Application to Life Contingencies*; *Formal Logic*; and *Budget of Paradoxes*. The last-named work is an entertaining account and criticism of the ideas of 'circle squarers' and 'perpetual motionists'.

De Morgan, William Frend (1839–1917), English novelist, son of the preceding. He commenced his career as a writer of fiction in 1905, and wrote amongst other novels: *Joseph Vance* (1906), *Alice-for-Short* (1907), *Somehow Good* (1908), *It Never Can Happen Again* (1909), and *When Ghost meets Ghost* (1914).

Demosthenes (c. 384–322 B.C.), Greek orator, was the son of a sword-cutler at Athens. He set himself to study eloquence, and though his lungs were weak, his articulation defective, and his gestures awkward, by perseverance he at length surpassed all other orators in power and grace. He denounced Philip of Macedon in his orations known as the *Philippics*. On the accession of Alexander in 336 Demosthenes tried to stir up a general rising against the Macedonians, but Alexander at once adopted measures of extreme severity, and Athens sued for mercy. The defeat of the Greeks by Antipater caused him to seek refuge in the temple of Poseidon, in the Island of Calauria, where he poisoned himself to escape from the emissaries of Antipater. Demosthenes is by most modern scholars considered to represent the acme of Attic eloquence. His fame as an orator is equal to that of Homer as a poet. Cicero pronounces him to be the most perfect of all orators. He carried Greek prose to a degree of perfection which it never before had reached. Everything in his speeches is natural, vigorous, concise, symmetrical. We have under his name sixty-one orations, some of which are not genuine.—Cf. S. H. Butcher, *Introduction to the Study of Demosthenes*.

Dempster, Thomas (1579–1625), Scottish scholar. His works are very numerous.

Among them his *Historia Ecclesiastica Gentis Scotorum* is the most remarkable.

Demurrage, in maritime law, the term used to denote the sum paid by the charterer or the other party or parties responsible in law to the shipowner for occupying the ship in loading or unloading during the day or days in excess of the number allowed for that purpose by the charter.

Denain, a town of Northern France, department of Nord, 6 miles from Valenciennes. It stands in the centre of a coal-field, and has large ironworks. It also has manufactures of beet sugar. Pop. 26,800.

Denbigh, county town of Denbighshire, Wales, is near the centre of the Vale of Clwyd. Tanning and shoemaking are carried on. Pop. (1931), 7249.

Denbighshire, a county of North Wales, on the Irish Sea; area, 426,080 acres, of which about a fourth is arable. Along the north the ground is level, in the east hilly, and there are mountains in the south and west. Barley, oats, and potatoes are grown on the uplands; and in the rich valleys wheat, beans, and pease. Cattle and sheep are reared, and dairy husbandry is carried on to a considerable extent. The minerals consist of lead, iron, coal, freestone, slate, and mill-stone. Flannels, coarse cloths, and stockings are manufactured. The principal rivers are the Clwyd, the Dee, and the Conway. Pop. (1931), 157,645.

Denderah, an Arab village of Upper Egypt, on the left bank of the Nile, 28 miles north of Thebes, celebrated for its temple dedicated to Athor, the best preserved of any of the great temples of antiquity in Egypt.

Dendermonde, a town, Belgium, at the confluence of the Dender with the Schelde. It is strongly fortified, and has manufactures of woollens, linens, and tobacco. Pop. 10,193.

Dengue, or **Dandy Fever**, is an acute infectious tropical disease, characterized by very high fever, intense pain in the joints and muscles, and accompanied by a rash somewhat like that of measles. Convalescence is often very slow. The disease is very seldom fatal.

Denham, Sir John (1615–1669), English poet. In 1641 he first became known by his tragedy of *The Sophy*, and in 1642 he published the first edition

of his most celebrated poem, *Cooper's Hill*.

Denia, a seaport of Southern Spain, Valencia, in the province of Alicante, with a large trade in raisins, grapes, and other fruit. The harbour admits vessels drawing up to 19 feet. Other ships anchor in 7 fathoms in the roadstead. Pop. 12,160.

Denikin, Anton Ivanovitsh (1872–), Russian soldier. He was in command of the South-Western armies during Kerensky's short term of office. Denikin assumed the command over the counter-revolutionary forces in Oct., 1918, and for a time fought valiantly and successfully against the Red armies of the Bolshevik Government. Soon, however, he suffered defeat after defeat, and early in 1920 he was completely beaten and escaped to England.

Denis, St., the apostle of the Gauls. He set out from Rome on his sacred mission towards the middle of the third century, became the first Bishop of Paris, and was put to death by the Roman Governor Pescennius.

Denison, a town, Texas, U.S.A. It is an important railway centre, and has a large trade in fruit and agricultural products. It manufactures cotton goods and machinery. Pop. 17,065.

Denizen. A denizen is a person of foreign origin who has conferred on him by the Crown by letters patent some of the privileges of a British subject. The grant may be absolute, limited, or conditional. The grant of letters of denization is a prerogative of the Crown which, although fallen into desuetude, is expressly preserved by the Naturalization Act of 1914.

Denizli, a town and vilayet of Asia Minor. The town is situated in a fertile valley, and is on the Smyrna-Aidin Railway. It has famous gardens and vineyards, and has a large trade in leather. Pop. (town), 20,000; (vilayet), 239,123.

Denmark, a kingdom of Northern Europe, consisting of the peninsula of Jutland, the district of Nord Slesvig (South Jutland Provinces), which became Danish by a plebiscite taken in 1920, and the great archipelago lying east of Jutland and consisting of the islands of Zealand, Fünen, Laaland, Falster, Bornholm, and many others. Greenland is the only

Danish colony—the West Indian Islands were sold in 1916 to the U.S.A., and Iceland is a sovereign state united with Denmark only through the identity of the king. The area and population in 1925 was as follows:

Division.	Area in Sq. Miles.	Population.
Copenhagen ..	28	587,150
Baltic Islands ..	5,133	1,271,872
Faeroe Islands ..	540	22,835
Jutland ..	11,408	1,575,533
Greenland ..	46,740	14,355

The capital is Copenhagen, on the Island of Zealand; other towns are Aarhus, Aalborg, Horsens, and Randers in Jutland, and Odense in Fünen. Denmark is bounded on the south by Germany; on the west by the North Sea; on the north by the Skagerrak, which separates it from Norway; and on the east by the Kattegat and the Sound, separating it from Sweden. The whole country is low-lying, particularly in the west of Jutland, where great dunes of drift sand, stretching from the Skaw to Blaavands Huk, make this region bleak, sterile, and practically uninhabitable. There is also much heath and moor land in Jutland, but elsewhere it is undulating and fertile. The islands, particularly Zealand and Fünen, are very fertile. Denmark was once covered with forests, but now there are only a few beech woods in the islands, though pine forests have of recent years been planted in Jutland. Rivers and lakes are numerous but small, the most important river being the Guden, which flows through Jutland to the

Kattegat and is navigable for part of its course. There are many sea inlets, the largest of which, the Lim Fiord, makes North Jutland practically an island. Between Jutland and the various islands there is a regular ferry service, and the total length of railway track in the kingdom is 3297 miles, over half of which is State owned. 80 per cent of the area of Denmark is productive, but only 40 per cent is arable. In 1928, 4,588,000 acres were in crop, principally in oats (999,400 acres), barley (872,000 acres, mainly in Zealand), rye (361,000 acres), wheat, and potatoes. Flax, hemp, hops, and tobacco are also grown, and cattle-rearing and dairy-farming are most important. The Jutland breed of horses is world famous. The farms, as a rule, are small, since the law does not allow the union of small holdings into large farms. Factory statistics for 1928 showed 4 distilleries producing 6,480,000 litres of brandy per annum, numerous breweries producing 2,000,000 litres of beer, 9 beet-sugar factories (output, 1928, 162,000 tons), 140 margarine factories (76,500 tons in 1928), and approximately 80,000 other industrial establishments, most of them very small, but including several iron-foundries and shipyards. Danish fisheries employed 15,565 boats in 1928, and produced fish valued at £2,021,000. Most of the Danish bread is made from rye, and beer, brewed by the peasants themselves, is the national drink. In 1928 the value of exports was £91,229,000, and of imports £95,592,000, and in 1929 the figures were, exports £94,004,000, and imports £98,698,000. In 1928 the principal exports were:

Commodity.	Value.	Destination.
Fresh eggs ..	£61,106,000	$\frac{2}{5}$ to U.K.; $\frac{1}{10}$ to Norway and Sweden.
Preserved eggs ..		$\frac{1}{10}$ to U.K.; $\frac{1}{10}$ to Norway and Sweden.
Bacon and pork ..		99½ per cent to U.K.
Fresh meat ..		$\frac{1}{2}$ to Netherlands; $\frac{1}{2}$ to U.K.; rest to Belgium, Sweden, &c.
Cheese ..		$\frac{1}{2}$ to Germany; rest to U.K.
Condensed milk, &c.	£4,630,000	Mainly U.K.; also European and overseas markets.
Live-stock ..		85 per cent to Germany; some to Czechoslovakia.
Horses ..	£1,000,000	
Hides and skins ..	£12,440,000	
Industrial products		

In 1929 Great Britain's imports from Denmark were valued at £56,178,663, and exports to Denmark at £10,671,482. The Danish mercantile marine consists of 1809 vessels of 1,096,000 tons (gross), 602 of 733,200 tons being steam, and 1047 of 335,948 tons being motor. The unit of the Danish monetary system is the *krona*, the normal value of which is $\frac{1}{16}$ th of a pound sterling. The population is almost entirely Scandinavian (96.5 per cent being Danes). The State religion is the Lutheran, which is embraced by 3,221,843 people (1921), and there are 22,000 Roman Catholics. Religious toleration is extended to all. Elementary education is free and compulsory, and there are numerous institutions for higher education, a university at Copenhagen, a veterinary and agricultural college, 278 technical schools, various agricultural schools, &c. The Danish monarchy, at one time elective, became hereditary in 1661, and hereditary and constitutional in 1849. The *Grundlov* or charter of 1849 was the basis of the new Constitution approved in 1915, and, owing to the addition of Nord Slesvig, amended in 1920. The legislative power lies with the king and with the *Rigsdag*, the executive power with the king, and the judicial power with the courts. The *Rigsdag* consists of the *Folketing* (House of Commons) and the *Landsting* (Senate). The army is a National Militia, and service is compulsory for all men on reaching the age of twenty. The navy is mainly for coastal defence, but the submarine and flying-boat services are being developed.

History.—In 920 King Gorm the Old united the Danish states, and his son Sweyn, who succeeded him, began the conquest of Norway and of England. This was completed by Canute, son of Sweyn, but England was lost in 1042 and Norway in 1047. In 1397 Queen Margaret, by the Union of Calmar, brought Denmark, Norway, and Sweden under her rule. The royal family of Oldenburg (reigned till 1863) was founded by the accession in 1448 of Christian I, Count of Oldenburg. Under his successor, Christian II, Sweden gained her independence. In the reign of Christian IV (1588–1648) Denmark took part in the Thirty Years' War, and in this and succeeding reigns was constantly at war with Sweden. By a peace signed in 1720, however, this animosity was

ended, and Denmark gained the toll on the Sound. In 1800, having acceded to the Northern Confederacy, war with Britain commenced, and led to the destruction of the Danish fleet at Copenhagen in 1801. The Danes, however, continued to support Napoleon, but in 1814 peace was made with Britain. By this Britain gained Heligoland and ceded the Danish West Indies, and Norway was given to Sweden. The House of Oldenburg died out in 1863, and Christian IX (Prince of Sonderburg-Glücksburg) was chosen by the Powers. Schleswig and Holstein were ceded to Prussia in 1864. Denmark remained neutral during the European War (see beginning of article).

Language and Literature.—The Danish language belongs to the Scandinavian branch of the Teutonic family, and is akin to Swedish. The oldest literary monuments of the Danes are the laws of the kings of the twelfth century, and a great collection of heroic ballads collected while they still lived in the mouths of the people, and covering the period up till the sixteenth century. Christian Pedersen (1480–1554) published a New Testament, a Psalter, and a Bible. Poetry after the Reformation is represented by Anders Arrebo (1587–1637) and Thomas Kingo (1634–1703), whose sacred poems are worthy of note. Louis Holberg (1684–1754) founded the Danish stage, other notable poets and dramatists of this great period being Ewald (1743–1781) and Wessel (1742–1785). The Romantic movement was continued by three great lyric poets, von Staffeldt (1769–1826), Øhlenschläger (1779–1850), and Blicher (1782–1848). Since then there have been many poets of outstanding power, including Paludan-Müller (1809–1876), Rosenhoff, Heiberg, Drachmann, and Ploug. Hendrik Hertz was one of the foremost dramatists, Hans Christian Andersen is famed throughout the world for his 'Fairy Tales', and Waldemar Thisted is a novelist of considerable note. The outstanding names of modern years are Jacobsen, Drachmann, and Georg Brandes, a literary critic of European fame.

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Dennis, John (1657–1734), English dramatist and critic. He devoted himself to literature, and wrote some dramatic pieces (*Liberty Asserted*) and poems, and at length settled down to criticism. His irritability and rancorous criticisms involved him in perpetual broils. Pope gave him a place in his *Dunciad*, and satirized him with merciless wit in his *Narrative of the Deplorable Frenzy of Mr. John Dennis*.

Denny, a town of Scotland, in Stirling-shire, on the south bank of the Carron, having paper-mills, ironworks, and engine-works. Pop. (with Dunipace) (1931), 5512.

Density, of a body, is its mass per unit of volume, and is usually expressed in pounds per cubic foot, or grammes per cubic centimetre. Thus the density of water is $62\frac{1}{2}$ lb. per cubic foot, or 1 gm. per cubic centimetre. The liquid mercury is denser than many solids, its density being 13.6 gm. per cubic centimetre. In physics, the density of a substance, referred to that of water at 4° C. as a standard, is called the relative density or specific gravity of the substance. Water has maximum density when at 4° C. or 39° F.

Dentatus, Manius Curius (d. c. 270 B.C.), Roman general of Sabine descent. In 290 B.C. he brought to a victorious termination the war with the Samnites, which had lasted for nearly fifty years. In 275 B.C. he defeated King Pyrrhus at Beneventum.

Dentistry is divided into two distinct departments, *dental surgery* and *mechanical dentistry*. The chief operations in dental surgery are *scaling*, or removing the tartar which has accumulated on the teeth; *regulating*, the restoring of overcrowded and displaced teeth to their proper position; *stopping*, the filling up of the hollow of a decayed tooth, the affected parts having been removed, and thus preventing the progress of decay; *extracting*, a process requiring considerable muscular power and delicacy of manipulation. Mechanical dentistry is concerned with the construction of artificial substitutes for lost teeth. The actual construction of the teeth, however, has passed largely into the hands of the manufacturers, and the dentist has only the selecting, fitting, and fixing to do. In 1878 an Act was passed regulating the education and registration of dentists, making a definite course of instruction,

and an examination necessary for all who wished to be registered as dental practitioners. Since Nov., 1922, any unregistered person practising as a dentist is liable to a fine of £100.

D'Entrecasteaux, the name of a group of islands belonging to British New Guinea, about 10 miles to the east of it, including Fergusson (500 sq. miles), Normanby, and Goodenough, with fine mountain scenery, boiling springs and other volcanic phenomena, and much fertile soil. The inhabitants are Papuans.

Denver, a city in the U.S.A., capital of the state of Colorado, on the right bank of the South Platte River. It is the junction of eight important railway systems, and is the centre for the distribution of live-stock from the Rockies. It has smelting-works, foundries, and flour-mills, and is the chief emporium for the precious metals of the state. The climate is peculiarly dry and salubrious. Pop. 256,491.

Deobund, a town of India, Saharunpur district, United Provinces, with manufactures of fine cloth. Pop. 19,500.

Deodand, a thing to be given or dedicated to God, an obsolete legal term for anything that had caused a person's death, all such chattels being forfeited by the old rule of the common law of England to the sovereign or lord of the manor. Deodands were abolished in 1846, largely owing to the increase of accidents due to locomotives.

Deodar. See *Cedar*.

Deogarh, a town in Bengal, with a group of temples to which numerous pilgrims resort. Pop. 9200.

D'Éon de Beaumont, Charles Geneviève Louise Auguste André Timothée (1728–1810), epicene French diplomatist. In 1755 he was sent as envoy on a difficult mission to the Russian Court, on which occasion he dressed himself as a woman. He afterwards went to London as secretary of the French legation, and ultimately became Minister Plenipotentiary. In 1777 he returned to France, was ordered to dress as a woman, and continued to do so both there and after he returned to England (1785), where he died in great poverty in 1810. A post-mortem examination, however, proved beyond doubt that D'Éon was a male.—Cf. Andrew Lang, *Historical Mysteries*.

Deposit, in law, something given or entrusted as security for the performance

of a contract. Such a deposit of money is equivalent to earnest, and is commonly given on contract for the sale of landed property and forfeited if the buyer fails to complete the purchase. Bankers receive money on *deposit* for which they pay interest, but which can only be withdrawn after specified notice. Deed or other securities may also be deposited as a pledge for money advanced.

Deposition, in law, the testimony given in court by a witness upon oath. Depositions are often taken conditionally, as when in civil actions the witnesses are sick, aged, or going abroad.

Deptford, a municipal borough, England, in the counties of Kent and Surrey, on the right bank of the Thames, now forming part of London. It has some manufactures of pottery, chemicals, and soap, and there are engineering works. The royal victualling yard is the largest establishment of its kind. Pop. (1931), 106,886.

De Quincey, Thomas (1785-1859), English author. After attending some time the Bath and Manchester grammar schools he ran away, ultimately arriving in London in an absolutely destitute condition. His sufferings at this time he has described in his *Confessions of an English Opium Eater*. In 1803 he matriculated at Oxford. On leaving college he settled at Grasmere, Westmorland. Here or in London he remained till 1828, reading voraciously, and writing for the *London Magazine*, *Knight's Quarterly Magazine*, and *Blackwood's Magazine*. From 1828 to 1840 he lived in Edinburgh, then removed with his family to Lasswade. His writings, nearly all contributions to magazines, are distinguished by power of expression, subtle thought, and an encyclopædic abundance of curious information.—**BIBLIOGRAPHY**: A. H. Japp, *Thomas De Quincey: his Life and Writings*; H. S. Salt, *De Quincey*; J. Hogg, *De Quincey and His Friends*.

Dera Ghazi Khan, a district and town in the Punjab, India. The former, which is in Derajat division, has an area of 5606 sq. miles, and a population of 445,000. The town has a population of 18,466, and has extensive manufactures of silk, cotton, and coarse cutlery.

Dera Ismail Khan, a town in India, in the North-West Frontier Province, near the Indus, which is here crossed by boat-bridges. It is a staple place for cotton

goods, has a cantonment, and carries on a trade with Afghanistan. Pop. 35,131.

Derajat, a commissionership of India, in the west of the Punjab, occupying part of the valley of the Indus. It is well watered and fertile, and contains numerous towns and villages. It is divided into Dera Ghazi Khan and Dera Ismail Khan. Pop. 1,800,000, mostly Mahomedans.

Derbend, a fortified town in Daghestan, Transcaucasia, on the west shore of the Caspian. Only small vessels can use the harbour. There are four great fairs every year. The manufactures consist of woollen stuffs, copper- and iron-ware, tobacco, and rose-water, and there is some trade in saffron. Pop. 40,000.

Derby, Edward Geoffrey Smith Stanley, fourteenth Earl of (1799-1869), English statesman. In 1830 he became Chief Secretary for Ireland in Lord Grey's Government, greatly distinguishing himself by his speeches in favour of the Reform Bill in 1831. In 1841 he became Colonial Secretary under Sir Robert Peel, but resigned on Peel's motion for repeal of the corn laws. In 1851 and 1858 he formed ministries which held office only for a short period; and again in 1866, when his administration signalized itself by the reform of the government in India, the conduct of the Abyssinian War, and the passing of a Bill for electoral reform (1867). Among other works he published a successful translation of Homer's *Iliad* in 1864.

Derby, Edward George Villiers Stanley, seventeenth Earl of (1865-), British politician. He became well known as the originator of the *Derby Scheme* (q.v.) when he was Director-General of Recruiting in 1915. Under-Secretary for War in 1916, he succeeded Mr. Lloyd George as Secretary when the latter became Premier. In 1918 he was appointed British Ambassador in Paris, but resigned his position in Sept., 1920.

Derby, a borough in England, capital of Derbyshire, on the Derwent. It has some fine public buildings. The manufactures include silk, cotton, hosiery, lace, articles in Derbyshire spar, iron castings, and porcelain; and engineering works of the London, Midland, and Scottish Railway are here. Derby is one of the oldest towns in the kingdom. Pop. (1931), 142,406.

Derby-day, the great annual London holiday, on which is run the horse-race

for the stakes instituted by Lord Derby in 1780. It always takes place on a Wednesday, being the second day of the grand race-meeting which falls at the end of May or the beginning of June. The race is run on Epsom Downs, an extensive Surrey course 15 miles from London. The course is $1\frac{1}{2}$ miles, and the time usually about 2 minutes 42 seconds. The entry money of each subscriber is fifty guineas, and the stakes are run for by three-year-old colts and fillies entered when yearlings.

Derby Scheme, a scheme produced by Lord Derby in 1915 with a view to making a final effort on behalf of voluntary recruiting. The scheme ensured that single men would be called up first, whilst men who had 'attested' could appeal to a tribunal and claim temporary or permanent exemption.

Derbyshire, a county of England, area 650,369 acres, five-sixths being arable or in permanent pasture. The southern and eastern parts are fertile, while the north-western portion is bleak, with a rocky and irregular surface. Here is the loftiest range of the English Midlands, the mountains of the Peak. The Peak itself is 2000 feet high. The principal rivers are the Derwent, the Trent, the Wye, the Erwash, the Dove, and the Rother. Oats and turnips are important crops, and dairy husbandry is carried on to a large extent. Coal is abundant in various parts of the county; iron ore is also plentiful, and lead, gypsum, zinc, fluor-spar, and other minerals are obtained. The manufactures are very considerable, especially of silk, cotton and lace, machinery, and agricultural implements. Pop. (1931), 757,332.

Dereham, East, a town in England, Norfolk, with manufactures of agricultural implements, iron-foundries, and a brisk trade. Pop. (1931), 5641.

Derg, Lough, (1) a lake, Donegal, Irish Free State, 3 m. long and studded with islets, one of which, called Station Island, is a resort of Roman Catholic pilgrims; (2) an expansion of the River Shannon between County Tipperary and Counties Clare and Galway, about 24 miles long and averaging 2 miles in breadth.

Déroulède, Paul (1846-1914), French poet, politician, and agitator. He sat in the Chamber of Deputies from 1893 to 1895 and from 1898 to 1899. In 1900 he plotted against the Republic, and sought to bring about a nationalist *coup d'état*.

Found guilty, he was sentenced to ten years' exile, but was allowed to return in 1905. His works include: *Chants de Soldat* (1872) and *Chants du paysan* (1894).

Derrick, a simple kind of crane, chiefly used on board ship, consisting of a stout pole swung from a mast, and carrying hoisting-tackle at its upper end. The name is derived from that of a celebrated hangman.

Dervish, a Mahommedan devotee, distinguished by austerity of life and the observance of strict forms. There are many different orders of dervishes, the underlying idea of most of them being the revival and increase of the Moslem faith. Some live in monasteries, others lead an itinerant life, others devote themselves to menial or arduous occupations.—Cf. J. P. Brown, *The Dervishes, or Oriental Spiritualism*.

Derwent, the principal river of Tasmania. It flows from Lake St. Clair in the centre of the island, and after a course of 180 miles enters the sea at Hobart. Ships of any size can ascend to Hobart.

Derwentwater, James Radcliffe, third and last Earl of (1689-1716), one of the leaders in the Rebellion of 1715. The standard of revolt having been raised in Scotland, Lord Derwentwater commenced the movement in England on 6th Oct., 1715, but was forced, along with the other Jacobite nobles, to surrender at discretion on 13th of Nov. He was executed on Tower Hill 24th Feb., 1716.

Derwentwater, a beautiful lake in Cumberland, England, in the Vale of Keswick. It is about 8 miles in length and $1\frac{1}{2}$ miles in breadth. Near the south-east corner is the celebrated cascade of Lodore. Its waters are carried to the sea by the Derwent.

Desaguadero, a river of Bolivia, issuing from Lake Titicaca, and carrying its waters into Lake Aullagas. Also a river in the Argentine Confederation flowing into Lake Bevedero Grande.

Desaix de Veygoux, Louis Charles Antoine (1768-1800), French general. After the Treaty of El Arish he followed Bonaparte to Italy, took command of the corps of reserve, and, arriving on the field of Marengo at a critical moment, decided the victory by a brilliant charge, 14th June, 1800. He himself fell, mortally wounded by a musket bullet.

Descartes, René (1596-1650), French

philosopher and mathematician, with whom modern philosophy is often considered as commencing. Educated at the Jesuit College of La Flèche, he entered the military profession, but in 1621 left the army and eventually settled in Holland. Descartes determined to build up a philosophical system for himself, divesting himself first of all of the beliefs he had acquired by education or otherwise. Proceeding in this way, he found (*Meditationes de Prima Philosophia*) that there was one thing that he could not doubt or divest himself of the belief of, and that was the existence of himself as a thinking being, and this ultimate certainty he expressed in the celebrated phrase "*Cogito, ergo sum*" (I think, therefore I am). Starting from this point, Descartes arrives finally at the idea of an absolutely perfect being; and from this last idea he deduces all further knowledge of truth. Descartes contributed greatly to the advancement of mathematics and physics, the method of co-ordinates, which has revolutionized geometry and is of fundamental importance in modern mathematical physics, being due to him. His system of the universe attracted great attention in his time. One of his fundamental doctrines was that the universe is full of matter, there being no such thing as empty space. On this basis he developed the hypothesis of celestial vortices, immense currents of ethereal matter, by which he accounted for the motion of the planets (*Principia Philosophiæ*, 1644). —BIBLIOGRAPHY: Sir J. P. Mahaffy, *Descartes*; E. S. Haldane, *Descartes: his Life and Times*; J. Veitch, *Method, Meditations, and Selections from the Principles of Descartes*.

Descent, in law, was by operation of law the transmission of the title to lands on the decease of the proprietor without will or other settlement. The principle determining to whom property belonged, on the death of the owner, was that of consanguinity or relationship by blood, though with some exceptions, as in the case of a portion or the use of a portion of a man's property given by the law of England to his widow. Kindred in blood are: (1) descendants, (2) ancestors, (3) collateral relatives. As from 1st Jan., 1926, real and personal property devolve according to the same rules. The whole estate of a person dying intestate is held

by the personal representative of the deceased upon trust or sale, with power to postpone the sale. In practice, however, only a part of the estate sufficient to pay death duties, debts, &c., is sold. The residue is then distributed according to the rules laid down in the Administration of Estate Act, 1925.

Deschanel, Paul Eugène Louis (1856–1922), French statesman and tenth President of the French Republic. In the Chamber of Deputies, to which he was elected in 1885, he soon displayed his power of eloquence, and eventually became the leader of the Progressive Republicans and exponent of the separation of Church and State. He was elected Vice-President of the Chamber in 1896 and in 1897, and President of the Chamber in 1898, retaining his office till 1902. Re-elected President of the Chamber in 1912, Deschanel retained his post until 1920, when he was elected President of the Republic by 734 votes. In the meantime, however, his health had given way, and on 23rd May, 1920, he fell out of a moving train. Unable to attend to the duties of his office, he resigned on 16th Sept. His works include: *Orateurs et Hommes d'État, Paroles Françaises* (1911), and *La France Victorieuse* (1919).

Desertion. In the military sense this implies the act of an officer or soldier who absents himself from His Majesty's service. The present existing Army Act recognizes two degrees of desertion, i.e. that committed on active service or when under orders for active service, and that committed under other circumstances. Under the former heading the maximum punishment is death; under the latter, imprisonment or penal servitude, according to the number of times the offence has been committed. A soldier convicted of desertion forfeits the whole of his service prior to conviction.

Desertion, in law, the term applied to the act by which a man abandons his wife or a wife her husband. Such desertion without due cause for not less than two years is, in England, ground for a judicial separation. By Scottish law, where either the husband or wife has deserted and remained separate without due cause for four years, divorce may be obtained.

Desirade, an island, West Indies, belonging to the French dependency of Guadeloupe. Fishing and the cultivation

of cotton are the chief occupations. Area, 10 sq. miles; pop. about 1600.

Desmidiaceæ, or **Desmidiæ**, a family of microscopic, fresh-water Green Alga, group Conjugatæ. Desmidiaceæ differ from Diatomaceæ in their green colour and absence of silica.

Des Moines, a city of the U.S.A., capital of the state of Iowa, on the Des Moines River. There are coal-mines in the vicinity, and the city is a great railway centre with manufactures of flour, machinery, &c. Pop. 126,468.

Des Moines, the largest river in Iowa, U.S.A., rises in Minnesota, and joins the Mississippi about 4 miles below Keokuk after a course of 300 miles.

Desmoulins, Benoît Camille (1760–1794), French journalist and politician. He was amongst the most notable of the pamphleteers and orators who urged the multitude forward in the path of revolution. He, along with others, prepared the plan for the taking of the Bastille (July, 1789), and was one of the founders of the club of Cordeliers, and the promoter of the assembly in the Champ de Mars. He was arrested on the order of Robespierre on 30th March, 1794, tried on the 2nd April, and executed on the 5th.

Desna, a river in the Ukraine, which rises in the government of Smolensk and joins the Dnieper near Kiev. It is 500 miles in length and navigable nearly throughout.

Dessalines, Jean Jacques (1760–1806), Emperor of Haiti. After the deportation of Toussaint-L'Ouverture, and the subsequent evacuation of the island by the French, Dessalines was appointed Governor-General for life with absolute power; and the year following (1804) was declared Emperor with the title of Jacques I. But his rule was savage and oppressive, and on 17th Oct., 1806, he was slain by one of his soldiers.

Dessau, a town in Germany, capital of the state of Anhalt, on the left bank of the Mulde. The manufactures consist of woollens, woollen yarn, carpets, machinery, and tobacco. Pop. (1925), 71,272.

De Stendhal. See *Beyle, Marie-Henri*.

Desterro. See *Florianopolis*.

Determinant, a mathematical expression which appears in the solution of a system of equations of the first degree. Determinants are very extensively used in higher algebra, co-ordinate geo-

metry, and other branches of mathematics.

Determinism, a term employed to denote a philosophical theory which holds that the will is not free, but is invincibly determined either—according to the older form of the theory—by a motive furnished by Providence, or—according to the modern form—by the aggregation of inherited qualities and tendencies.

Detmold, a town, Germany, capital of the Republic of Lippe, on the left bank of the Werra. The chief industries are tanning and brewing. The Senner race of horses is bred near Detmold. Pop. 16,051.

Detroit, a flourishing port of Michigan, U.S.A., situated on the Detroit River, connecting Lakes Erie and St. Clair. The greater part of the Great Lakes shipping trade is connected with this city. Among the industrial establishments are sawmills, flour-mills, building-yards for ships and boats, foundries, tanneries, blast-furnaces, pork-packing establishments, tobacco and cigar manufactories, and locomotive works. The harbour is one of the finest in the United States, and has a depth of water sufficient for the largest vessels. Pop. 993,678.

Detroit River, or **Strait of St. Clair**, a river of North America which runs from Lake St. Clair to Lake Erie. It is 28 miles long, and of sufficient depth for the navigation of large vessels. It is open for navigation eight months in the year.

Detskoe Selo. See *Tsarskoe Selo*.

Deucalion, in Greek mythology, the son of Prometheus. According to tradition, he saved himself and his wife, Pyrrha, from a deluge which Zeus had sent upon the earth, by building a ship which rested upon Mount Parnassus. To repair the loss of mankind they were directed by an oracle to throw stones behind them; the stones thrown by Deucalion became men, those thrown by Pyrrha women.

Deuteronomy (Gr. *deuteronomion*, the second law), the name of the fifth book of the *Pentateuch*. Until the seventeenth century it was believed to have been written by Moses, but now it is generally held to be a compilation, the bulk of it having been written in the reign of Manasseh, or according to other scholars in the reign of Josiah. At any rate the book was discovered or rediscovered while Josiah was king (2 *Kings*, xxii).

Deutz, a town in Prussia, on the right bank of the River Rhine, opposite the city

of Cologne, with which it communicates by a bridge. There are some manufactories of porcelain and glass, also an iron-foundry and machine-works. Pop. 17,060.

De Valera, Eamon (1883—), Irish Republican of Spanish extraction. He was condemned to death for the part he played in the Sinn Fein rebellion of Easter Week, 1916, but his life was spared. He was elected 'President' of the so-called 'Irish Republic' soon afterwards, and was for a time imprisoned by the Free State Government.

Deventer, an old town in Holland, province of Overijssel, at the confluence of the Schipbeek and Ijssel. Its industries embrace carpets, cast-iron goods, printed cottons, hosiery, and tobacco. It has a large export trade in butter. Pop. 33,164.

Deveron, a river of Scotland, belonging to Aberdeenshire and Banffshire, 60 miles long. It flows into the Moray Firth at Banff.

Deviation of the Compass, the deflection of a ship's compass needle from the magnetic meridian, caused by adjacent iron. Hard iron is very retentive of a magnetic state. Soft iron easily receives or loses magnetism, and its magnetic state varies with every shifting of the ship's head. The effect of the former can be counteracted by magnets suitably placed near the compass, that of the latter by spheres of soft iron. The ship is swung, and the compass errors found in the various positions. Similar effects are noted in aircraft and corrected in the same way.

Devil, in theology, the name given to a fallen angel, who is the instigator of evil and the ruler of darkness. The doctrine of Zoroaster, who adopted an evil principle called Ahriman, opposed to the good principle and served by several orders of inferior spirits, spread the belief in such spirits among the people. With the Mahomedans *Eblis*, or the devil, was an archangel whom God employed to destroy a pre-Adamite race of *jinn*s, or genii, and who was so filled with pride at his victory that he refused to obey God. The Satan of the New Testament is also a rebel against God. He uses his intellect to entangle men in sin and to obtain power over them. From the New Testament we hardly learn more regarding the devil than that he has a distinct personality; that he is a spirit or angel who in some way fell; and that he is devoid of truth and of all moral good-

ness.— Cf. Carus, *History of the Devil*.

Devil-fish, a name somewhat indiscriminately used to describe (1) the grey whale; (2) various fishes, the most common being the angler; (3) a large species of ray, the best known being *Manta birostris*, found in the Gulf of Mexico, and much dreaded by divers; (4) the eight-armed octopus.

Devil's Bit, the common name of a British species of scabious (*Scabiosa succisa*), nat. ord. Dipsacæ.

Devil's Punch-bowl, a small lake of Irish Free State, near the Lakes of Killybegny. The name is also given to Highcomb Bottom, a glen in Surrey.

Devizes, a borough of England, county of Wilts. Agricultural engines and implements are made, and malting is carried on. Pop. (1931), 6058.

Devonian System, in geology, a name originally given to rocks in Devonshire and Cornwall, intermediate between the Silurian and Carboniferous strata, and consisting of sandstones, calcareous slates, and limestones, &c. Devonian rocks occupy a large area in Central Europe, as well as in the United States, Eastern Canada, and Nova Scotia. The terrestrial and lacustrine equivalents are known as the Old Red Sandstone.

Devonport, a seaport in Devonshire, now part of Plymouth. It is the seat of one of the royal dockyards, is an important naval and military station, and is well fortified. Connected with the dockyards and fortifications are the gun wharf, foundries, machine-works, rope-walks, store-houses, and naval and military barracks.

Devonshire, Spencer Compton Cavendish, eighth Duke of, long known as Marquess of Hartington (1833–1908), British statesman. In 1871 he was appointed Chief Secretary for Ireland. He went out with the Gladstone ministry in 1874, and on Gladstone's retirement he became the leader of the Liberal party. On the fall of the Conservative Government in 1880 he became Secretary for India under Gladstone, being transferred to the War Office in 1882. He strenuously opposed Gladstone's Home Rule Scheme of 1886, and became the leader of the Liberal Unionists. In 1895 he became Lord President of the Council, and from 1900 to 1902 he was President of the newly-instituted Board of Education. In 1903 he accepted the

position of head of the Free-Trade Unionists.

Devonshire, a maritime county in the south-west of England, its northern coast being on the Bristol Channel and its southern on the English Channel; area, 1,671,364 acres. Its principal rivers are the Torridge and the Taw, flowing north into the Bristol Channel; and the Exe, Axe, Teign, Dart, and Tamar, flowing into the English Channel. From Exeter to the confines of Cornwall extends the wide and barren tract called Dartmoor; but the Vale of Exeter, comprising from 120,000 to 130,000 acres, and the south extremity of the county called *South Hams*, limited by a line drawn from Torbay to Plymouth Sound, are amongst the most fertile districts of England. Tin, lead, iron, copper, manganese, granite, and the clay used by potters and pipe-makers are the chief mineral products. Dairy-farming has been developed at the expense of agriculture. Wheat, barley, beans, pease, and potatoes are the principal crops. There is a large trade in butter, cheese, and live-stock, and the 'clotted' cream and cider of Devonshire are well known as specialties of the county. Pop. (1931), 732,869. See *Devonian System*.—Cf. F. J. Snell, *Devonshire: Historical, Descriptive, and Biographical*.

Dew is the name given to the minute drops of water which at certain times appear by night upon grass, flowers, foliage, and other surfaces which readily radiate heat. According to the theory accepted till recently without qualification, dew comes from the aqueous vapour in the atmosphere. For any given state of the atmosphere, in respect of the amount of aqueous vapour it contains in a specified volume, there is a certain temperature at which it can hold just that amount and no more in suspension. If it be cooled to that temperature, it begins to deposit its moisture in the liquid form, and if the cooling proceeds further, more and more is deposited. This particular temperature is the *dew-point* appropriate to the given state of humidity of the air. If the dew-point is below 32° F., the vapour will, when the dew-point is reached, pass directly into the solid form and be deposited as hoar-frost. Dr. John Aitken has, however, established by experiments that in many cases the dew found on plants does not come mainly from the

atmosphere. To some extent it exudes from the plants themselves. They derive moisture from the soil, and in the process of supplying their tissues it passes to their outer surfaces, whence in the daytime it is evaporated into the air. By night the fall of temperature checks evaporation of this moisture, and when it reaches their surfaces, it may remain there in the form of dew-drops.

Dewar, Sir James (1842–1923), Scottish scientist, was Fullerman professor of chemistry at the Royal Institution, London, from 1879. He was awarded the Rumford medal in 1894 for his investigations into the properties of matter at its lowest temperatures, this branch of science, with which the liquefaction of air and gases is connected, being peculiarly his own. He was the first to reduce hydrogen gas to the liquid and solid form, and invented the thermos flask. He was president of the British Association in 1902, and was knighted in 1904.

Dewas, a native state of Central India, consisting of two combined states with two chiefs. Total pop. 250,000. Dewas, the chief town, has a pop. of 5200.

Dewberry (*Rubus ccesius*), a European plant belonging to the order of the Rosaceae, and to the same genus as the bramble, from which it is distinguished by several characteristics. It is common in some parts of England.

De Wet, Christian Rudolf (1854–1922), Boer general. In the South African War he commanded first in Natal, and then in the west under Cronje. After March, 1900, he distinguished himself by his attacks on the British lines of communication, and by his skill in evading capture. He joined the rebellion at the outbreak of the European War, but was captured at Waterburg on 1st Dec., and sentenced to a fine of £2000 and six years' imprisonment.

Dewey, George (1837–1917), American naval officer. He was in command of the squadron which destroyed the Spanish fleet at Manila on 1st May, 1898.

De Witt, Jan (1625–1672), Dutch statesman. He became the leader of the political party opposed to the Prince of Orange. In 1672 his brother Cornelius, who had been tried and put to torture for conspiring against the life of the young Prince of Orange, lay in prison. Jan de Witt went to visit him, when a tumult suddenly arose amongst the people, and

both brothers were torn to pieces by the mob.

Dewsbury, a borough, England, in the West Riding of Yorkshire, chiefly engaged in the manufacture of heavy woollen cloths, including blankets, carpets, rugs, flannels, and baizes. Pop. (1931), 54,303.

Dextrine, or **British Gum**, ($C_6H_{10}O_5$)_x, a generic name applied to soluble gummy substances intermediate between starch and glucose. They are prepared from starch by the aid of dilute mineral acids or of enzymes, and are usually named according to the colour they give with iodine, e.g. erythro-dextrine, &c. When heated with dilute acids, they are transformed into glucose. They are white, odourless substances, and are good substitutes for gum-arabic. Dextrine is used in calico-printing for thickening colours, for the preparation of gums, and for stiffening cloth.

Dhalak, an archipelago of the Red Sea, belonging to the Italian territory of Eritrea. It consists of nearly 100 islets, mostly uninhabited, clustering round the Island of Dhalak-el-Kebir, which is about 35 miles long by 30 miles broad. This island possesses a pearl-fishery.

Dhar, a small native state in Central India, with an area of about 1783 sq. miles. The soil is fertile, and yields wheat, rice, and poppies. Pop. 169,474. The capital is of the same name. Pop. 19,000.

Dharangaon, a town of India, in Khandesh district, Bombay. Pop. 15,000.

Dharmasala, a hill station in Kangra district, Punjab, India. Pop. 6170.

Dharwar, the chief town of Dharwar district, in the Bombay Presidency, India. Pop. 32,000.—The Dharwar district has an area of 4535 sq. miles; pop. 1,051,314. The principal products are cotton, millet, oil-seeds, and sugar-cane.

Dhawalagiri, one of the highest peaks of the Himalayas, in Nepal; height, 26,828 feet.

Dholera, a town of India, Bombay Presidency, on a stream entering the Gulf of Cambay, an important cotton-mart. Pop. 10,190.

Dholka, a town of India, Bombay Presidency, probably one of the oldest towns in Gujarat. Pop. 13,000.

Dholpur, a native state of Central India, Rajputana; area, 1200 sq. miles; pop. 230,188. The capital is also called Dholpur. Pop. 9750.

Dhulia, a town of India, Khandesh district, Bombay Presidency. It has an important cotton trade. Pop. 22,000.

Diabase, originally an equivalent of diorite; then used for chloritic igneous rocks of the Intermediate series of various grain; and now usually for a type of dolerite in which the felspar is embedded in augite.

Diabetes is a disease due to disturbance in the carbohydrate metabolism. As the result these carbohydrates are not properly assimilated, but passed as sugar in the urine. It is characterized by great thirst, voracious appetite, and the passage of an excessive quantity of urine in which sugar is present in quantities varying from 2 to 10 per cent. The skin is dry, and skin irritations (pruritus) are apt to occur. The patient is usually emaciated. Research work has established a definite relationship between cells in the pancreas and the disease. The chief considerations in the treatment of diabetes are (1) that great care must be given to the patient's diet, in which all foods leading to an increased output of sugar must be strictly avoided, and (2) that insulin (q.v.) is administered in appropriate doses. The general health of the patient must, of course, be maintained, and worry avoided as far as possible. In acute cases the disease may run a very rapid course, coma frequently supervening a few days before death, but chronic cases may live for ten to twenty years.

Diablerets, Les, a mountain group of the Bernese Alps, Switzerland, between the cantons Vaud and Valais. The highest peak has a height of 10,620 feet.

Diagonal Scale, a scale which consists of a set of parallel lines drawn on a ruler, with lines crossing them at right angles and at equal distances. One of these equal divisions, namely, that at the extremity of the ruler, is subdivided into a number of equal parts, and lines are drawn through the points of division obliquely across the parallels. With the help of the compasses such a scale facilitates the laying down of lines of any required length to the 200th part of an inch. The method is a good deal simpler than any demanding a special instrument, such as the vernier or the micrometer gauge.

Dial, or **Sun-dial**, an instrument for showing the hour of the day from the shadow thrown by a *stile* or *gnomon* upon

a graduated surface while the sun is shining. The stile is made parallel with the earth's axis, and may be considered as coinciding with the axis of the sun's apparent diurnal motion. Consequently, as the sun moves westwards the shadow of the stile moves round opposite to it, in the same direction, falling successively on lines drawn to represent the hours of the day. The dial, of course, gives true solar or *apparent* time, which, except on four days of the year, is somewhat different from *mean* time.

Diallage, an altered form of the mineral augite, with a lamellar structure, and a submetallic lustre on its planes of separation. Schillerstein, or schiller spar, is a similar product of the allied but rhombic mineral hypersthene. It forms diallage rock, and enters into serpentine rock.

Diamantina, a city, Brazil, in the diamond-mining district in the state of Minas Geraes. The chief industries are connected with diamond-cutting and the manufacture of cotton, cigars, and leather. Pop. about 14,000.

Diamond, the hardest and one of the most valuable of gems, and the purest form in which the element carbon is found (see *Carbon*). It crystallizes in forms be-

fig. 1 is the diamond in its rough state; fig. 2 is the vertical, and fig. 3 the lateral appearance of a brilliant; fig. 4 the vertical, and fig. 5 the lateral appearance of a rose-cut diamond; in fig. 6 the flat portion *a* in a cut stone is called the *table*; the part *a b b*, which projects from the setting, is the *front*, the part *b b c*, sunk in the setting, is the *back* or *culasse*, while the line *b b* is the *girdle*. Diamonds are valuable for many purposes. Their powder is the best for the lapidary, and they are used for jewellery watches, and in the cutting of window- and plate-glass. When used as a glazier's tool the diamond must be uncut. Inferior kinds of diamonds are also extensively used by engineers in rock-boring, and by copper-plate engravers as etching-points. Diamonds are obtained from deposits of various kinds, mostly alluvial (sands, clays, &c.), being separated by washing. They have been found in India, Borneo, and other parts of the East; sometimes in North America and Australia; Brazil has produced large numbers; but the chief diamond-field of to-day is in Cape Province, the centre being Kimberley. The *Cullinan* diamond, the largest in the world, weighs 3025 carats. Among other famous diamonds are the *Koh-i-noor*, belonging to the British crown, and now weighing 106 carats; the *Orlov* (194 carats) belonged to the Russian royal family; the *Pitt* (136½ carats) was among the French crown jewels.

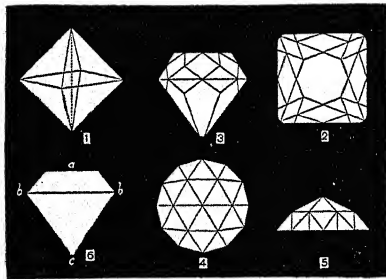
Diamond Necklace. See *Marie Antoinette*; *La Motte*; and *Rohan-Guéménée, Louis*.

Diana, a goddess of the Romans, in later times identified with the Greek *Artemis*, with whom she had various attributes in common, being the virgin goddess of the moon and of the chase, and having as attributes the crescent moon, bow, arrows, and quiver.

Diana-monkey (*Cercopithecus Diana*), a species of monkey found in West Africa, and so named from the crescent-shaped band on the forehead resembling the crescent moon, which was the symbol of Diana.

Diana of Poitiers, Duchess of Valentinois (1499–1566). She was the mistress of King Henry II of France. When the Duke of Orleans came to the throne in 1547, as Henry II, Diana exercised an absolute empire over him till his death in 1559.

DiARBEEKR, a town of Kurdistan, Asiatic



Diamonds, rough and variously cut

longing to the regular or cubic system. The finest diamonds are colourless, perfectly clear, and pellucid. Such are said to be of the finest *water*. But diamonds are often blue, pink, green, or yellow, and such are highly prized if of a decided and equal tint throughout. The hardness of the diamond is such that nothing will scratch it, nor can it be cut but by itself. The value of a diamond is much enhanced by cutting facets upon it. In the cut,

Turkey, capital of the vilayet of same name, on the Tigris, and surrounded by a lofty massive wall. It has manufactures of iron- and copper-ware, leather, silk, woollen and cotton goods, and a considerable trade with Aleppo and Baghdad. It is an important caravan centre. Pop. about 38,000. —The vilayet of Diarbekr has a pop. of (1927) 194,316.

Diarrhœa is morbidly frequent evacuation of the bowels. Several forms are recognized. *Choleraic diarrhœa*; this form is acute, and is marked by great frequency, with serous stools, and accompanied by vomiting and collapse. *Mucous diarrhœa* is marked by the presence of mucous in the stools. *Summer diarrhœa*, occurring chiefly among young children and infants, is usually acute in type and associated with marked prostration. In epidemic form it may give rise to a high mortality. *Nervous diarrhœa* is produced by some emotional cause. For all forms purgatives are given, and all solid food forbidden. This is followed by gastro-intestinal sedatives and a gradual return to normal diet.

Diastase. See *Fermentation*.

Diatomaceæ, a family of Algæ, consisting of microscopic unicellular plants with brown chromatophores, found in fresh, brackish, and salt water, and on damp ground. The cell wall contains a very large quantity of silica. Diatoms constitute an important source of food for the lower marine animals, and thus indirectly for the food-fishes. Diatomaceæ are found fossil, forming considerable deposits of tertiary age, as at Bilin, Richmond in the United States, &c. They are abundant in guano.

Diatomite, a diatomaceous earth (see *Diatomaceæ*) generally found underlying peat. It is found in Skye and County Antrim. Diatomite is principally used for the manufacture of dynamite, and is well adapted for the manufacture of silicate paints, siliceous glazings, porcelain, boiler-coatings, and for isolating felt and bricks for cold-storage buildings.

Diaz, Bartolommeo (d. 1500), Portuguese navigator. In 1486 he was commander of two vessels which doubled the Cape of Good Hope without knowing it. In again doubling the Cape he gave it the name of Cabo Tormentoso (Cape of Storms), which the king changed to its present designation. In 1500 Diaz had command of a vessel in the expedition

of Cabral which discovered Brazil. In returning home the vessel which he commanded was lost.

Diazo Compounds, or **Diazonium Compounds**, a name given to substances containing the chemical group $-N:N-$; e.g. diazobenzene chloride, $C_6H_5-N:N\cdot Cl$. These substances are formed from the aromatic amines by treatment with nitrous acid at low temperatures. Diazo salts are crystalline compounds soluble in water, sparingly soluble in alcohol, and are unstable, decomposing explosively if struck or suddenly heated. In solution in water they decompose as the temperature rises, liberating nitrogen, and forming hydroxy compounds. Diazo salts are valuable in the synthesis of different classes of compounds, as the $-N:N-$ group reacts readily with other groups. Diazo compounds are important intermediate substances in the manufacture of azo dyes.

Dibdin, Charles (1745–1814), English dramatic manager and poet. His patriotic songs were very popular, and his sea-songs, amongst which are *Tom Bowling*, *Poor Jack*, and *The Trim-built Wherry*, are still remembered. He also wrote a *History of the Stage*, and the novels *The Devil* and *Hannah Hewitt*.

Dibdin, Thomas Frognall (1776–1847), English bibliographer. Among his numerous writings may be noted: *Bibliomania*, *Bibliographical Decameron*, *Typographical Antiquities of Great Britain*, and *The Library Companion*.

Dice. The origin of dice is ascribed to Palamedes of Greece (1244 B.C.), although Herodotus attributes the invention of knuckle-bones and of dice to the Lydians. Dice were well known amongst the ancient Egyptians and Greeks, and are still very popular in Japan, China, India, and other Asiatic countries.

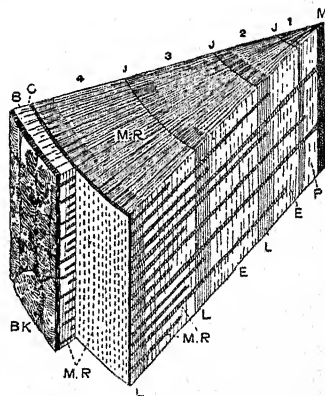
Dichogamy, in flowers, the condition in which anthers and stigmas ripen at different times, whereby self-pollination is effectually prevented.

Dichroic, or more generally **Pleochroic**, **Crystals**, crystals that have the property of exhibiting different colours, according to the direction in which they are traversed by rays of light. When polarized light is passed through a transparent plate of a pleochroic mineral, the colour will vary with the direction in which the light-vibrations take place.

Dickens, Charles (1812–1870), English novelist. He received a scanty education, and was for a time employed in a blacking warehouse, and subsequently as a clerk in an attorney's office. Having perfected himself in shorthand, however, he became a newspaper critic and reporter. In 1835 the first of the *Sketches by Boz* appeared in *The Morning Chronicle*. In 1836 Chapman & Hall engaged the new writer to prepare the letterpress for a series of comic sketches on sporting subjects by Seymour. Seymour committed suicide soon after, and H. K. Browne joined Dickens as illustrator, the result being the immortal *Pickwick Papers*. In 1837 Dickens was engaged as editor of *Bentley's Magazine*, to which he contributed *Oliver Twist*. Before its completion, *Nicholas Nickleby* was begun, being issued in 1839. *Master Humphrey's Clock*, issued in weekly numbers, contained among other matter two other leading tales, *The Old Curiosity Shop* and *Barnaby Rudge*, the latter an historical tale, going back to the times of the Gordon riots. In 1841 Dickens visited America, and on his return he wrote *American Notes for General Circulation* (1842). His next novel, *Martin Chuzzlewit* (1844), dwelt again on his American experiences. A series of *Christmas Tales* comprised: *A Christmas Carol* (1843), *The Chimes* (1844), *The Cricket on the Hearth* (1845), *The Battle of Life* (1846), *The Haunted Man* and *The Ghost's Bargain* (1847). Next followed his novel of *Dombey and Son* (1848), and *David Copperfield*, a work which has a strong autobiographical element in it (1849). In 1850 Dickens became editor of the weekly serial *Household Words*. In 1853 his *Bleak House* came out. *Hard Times* appeared in *Household Words*, and was published in 1854. *Little Dorrit* was commenced in 1856. In 1859, in consequence of a disagreement with his publishers, *All the Year Round* superseded *Household Words*; and in the first number of this periodical, 28th May, was begun *A Tale of Two Cities*. *Great Expectations* followed in the same paper, on 1st Dec., 1860. In *All the Year Round* also appeared a series of disconnected sketches called *The Uncommercial Traveller*, published in 1868. *Our Mutual Friend*, completed in 1865, and published in the usual monthly numbers, with illustrations by Marcus Stone, was the last great serial work which Dickens lived to finish. The

first number of his last work, *The Mystery of Edwin Drood*, was issued on 1st April, 1870, and only three numbers had appeared when he died somewhat suddenly. Dickens's work as a novelist is firmly based upon a wide and keen observation of men. The essence of his art was caricature, and for comic effect he, therefore, often exaggerated the abuses he attacked. In spite of all that is grotesque and overstrained in his work, he has been rightly placed amongst the great artists.—BIBLIOGRAPHY: J. Forster, *Life of Charles Dickens*; George Gissing, *Charles Dickens: a Critical Study*; G. K. Chesterton, *Charles Dickens*.

Dicksee, Sir Francis Bernard (1853–1928), British painter. He first exhibited at the Academy in 1876, became A.R.A. in 1881, R.A. in 1891, and was elected president of the Royal Academy in 1924. His pictures include: *Harmony* and *Two Crowns* (Tate Gallery), *The Passing of Arthur*, *The Confession*, and *La Belle Dame sans Merci*, besides numerous portraits. He was knighted in 1925.



Portion of a Four-year-old Dicotyledonous Woody Stem cut in Winter

B, Bast. BK, Bark external to the periderm layer, corresponding to the primary cortex. C, Cambium ring. E, Early wood. J, J, J, Junction of the wood of successive years. L, Late wood. M, Medulla. MR, Medullary rays, various views. P, Protoxylem. I, 2, 3, 4, The four successive annual rings.

Dicotyledon, a plant whose seeds are readily recognized by the embryo containing a pair of cotyledons or seed-leaves,

which are always opposite to each other. Dicotyledons are further characterized by their netted-veined leaves and their 'open' vascular bundles containing a cambium; the parts of the flower are commonly in fours or fives. In Bentham and Hooker's system the class is divided into four sub-classes—Thalamifloræ, Calycifloræ, Corollifloræ, and Monochlamydeæ. Engler's system recognizes only two sub-classes, viz. Archichlamydeæ and Symptetaleæ.

Dictaphone, a gramophone of the wax-cylinder type. Letters or memoranda are spoken into the machine, which 'records' them on waxen cylinders. The machine is given to a typist, and the recorded matter is dictated.

Dictator, an extraordinary magistrate of the Roman Republic, first instituted 501 B.C. The dictatorship was limited to six months' duration, and the person who held it could not go out of Italy. He had the power of life and death, and could punish without appeal to the Senate or people. All the other magistrates were under his orders.

Dictionary, a book containing the words, or subjects, which it treats, arranged in alphabetical order. Amongst dictionaries of the English language, the earliest seem to have been those of Bullokar (1613) and Cockeram (1623). That of Dr. Johnson, published in 1755, made an epoch in this department of literature. Previous to this the chief English dictionary was that of Bailey, a useful work in its way. The best-known American dictionary of the English language is that by Noah Webster, published in 1828, and since entirely recast. Richardson's dictionary, published during 1836 and 1837, was valuable chiefly for its quotations. Ogilvie's *Imperial English Dictionary*, based on Webster, and first published between 1847 and 1850, has been issued in a remodelled and greatly enlarged form (4 vols. 1881–1882 and subsequently, Charles Annandale, LL.D., editor). It is one of the encyclopædic dictionaries. Cassell's *Encyclopædic Dictionary* is another extensive work (1879–1888). One of the largest English dictionaries is the *Century Dictionary* (New York, 1889–1891, 6 vols. quarto). *The Standard Dictionary* is another American work. A new English dictionary 'on historical principles', edited by Sir James A. H.

Murray, Henry Bradley, W. A. Craigie, and C. T. Onions, was begun in 1884, and was finally completed in 1928. It is published at Oxford by the Clarendon Press. The chief etymological dictionary of English words is that by Professor Skeat (1882). Among French dictionaries (for French people) the chief is that of Littré; among German, the dictionary begun by the brothers Grimm.

Didactic Poetry, that kind of poetry which professes to give a kind of systematized instruction on a definite subject or range of subjects. Thus the *Georgics* of Virgil and the *De Rerum Natura* of Lucretius profess to give, the one a complete account of agriculture and kindred arts, the other a philosophical explanation of the world. Other examples of purely didactic poetry are Horace's *Ars Poetica* and Pope's *Essay on Criticism*.

Diderot, Denis (1713–1784), French writer and philosopher. In 1749 he, along with D'Alembert and some others, began the *Encyclopædia*. Diderot, besides revising the whole, undertook at first the mechanical arts, and subsequently made contributions in history, philosophy, and art criticism. Among the best known of his other works are: *Le Neveu de Rameau*, a kind of philosophical dialogue; *Essai sur la Peinture* and *Paradoxe sur le Comédien*; and two lively tales, *La Religieuse* and *Jacques le Fataliste*.—**BIBLIOGRAPHY**: T. Carlyle, *Essay on Diderot*; R. L. Cru, *Diderot as a Disciple of English Thought*.

Dido, or **Elissa**, the reputed founder of Carthage (founded c. 860 B.C.). Her story is told by Virgil, with many inventions of his own, in the *Æneid* (Books i and ii).

Didot, a famous house of printers, booksellers, and typefounders at Paris. The founder was François Didot (1689–1757).

Didsbury, a district of Manchester, a place of residence of many Manchester business men.

Didunculus, a genus of birds allied to the pigeons, and comprising only the one species, *D. strigirostris*, native to some of the Samoan Islands. This bird is of special interest as being the nearest living ally of the extinct dodo.

Diego Garcia, an island in the Chagos group, Indian Ocean. It belongs to Britain, is a dependency of Mauritius,

is $12\frac{1}{2}$ miles long and exports coco-nut oil, copra, and guano. Pop. (of group), 2000; (of island), 445.

Diego Suarez, a port in the north of Madagascar. It stands on a fine bay, and there is anchorage for vessels of all sizes. There is a graving-dock. The chief exports are rubber, timber, copra, and bark. Pop. 10,000.

Dieppe, a seaport, France, department of Seine-Inférieure, on the English Channel, at the embouchure of the Arques. To the west of Dieppe proper is the suburb La Barre, and on the opposite side of the harbour Le Pollet, inhabited chiefly by sailors and fishermen. The old port is spacious, but a new channel with its own harbour system has been added, and vessels of 20-foot draft can now enter. There are several floating docks. Dieppe is one of the chief watering-places of France. The manufactures include works in ivory, horn, and bone, lace-making, sugar-refining, and shipbuilding. There is a busy fishery, and the foreign trade is still considerable. There is regular steam intercourse between this port and New-haven. Pop. 23,973.

Dies and Die-sinking, Die-sinking is the art of preparing dies, a die being a plate or block, usually of metal, so cut or shaped as to be capable, by means of stamping or pressure, of transferring a given design to some article which is to be manufactured in quantity.

The steel for the manufacture of steel dies is carefully selected, forged at a high heat into the rough die, softened by careful annealing, and then handed over to the engraver. After the engraver has worked out the design in intaglio, the die is put through the operation of hardening, after which, being cleaned and polished, it is called a *matrix*. This is not, however, generally employed in multiplying impressions, but is used for making a *punch* or steel impression for relief.

Dies for the reproduction of rubber stamps for printing on clay are cut in phosphor-bronze or hard brass in relief and reverse, and with an extreme bevel. Dies for wallpapers are cut on rollers. Steel dies for flower-shapes have a cutting edge, so that they can stamp out and emboss in one action. One machine, called the pantograph or engraving machine, reproduces engravings in all metals and many shapes from patterns.

Many of the stamp-duty steel dies made and issued by the Royal Mint are reproduced from this machine in reductions from brass patterns.—Cf. J. V. Woodworth, *Dies: their Construction and Use*.

Diesel, Rudolph (1858–1913), German inventor, partly educated in England. He was the inventor of the Diesel engine (see *Internal Combustion Engines*), and in 1894 published a monograph entitled *Theory and Construction of a Rational Heat Motor*.

Diest, a town, Belgium, province of Brabant. It has some manufactures, but the chief products of the place are beer and gin. Pop. 8800.

Dietetics. See *Foods and Food Values*.

Dieu, an island off the west coast of France, department of Vendée. It is inaccessible on the west side, but on the east has a tolerable harbour defended by batteries. The chief industry is fishing. There are four lighthouses on the island. Pop. 3800.

Diez, Friedrich Christian (1794–1876), German philologist. His work stands in much the same relation to the Romance dialects which the researches of Grimm occupy with respect to German dialects. In addition to various works on the poetry of the Troubadours, he published a very valuable *Grammatik der Romanischen Sprachen*.

Differdange, a town, Luxembourg, 12 miles south-west of Luxembourg (town). Pop. 13,129.

Difference, a stock-exchange term. When stock is bought or sold merely as a speculation for the rise or fall, with no intention of the buyer to 'take up' the stock, or of the seller to deliver it, the 'difference' is the movement in price which may take place between the date of the transaction and the following 'settling-day'. If the price falls, the buyer has to pay the difference upon 'carrying over' his purchase to the next account; if it rises, the seller is at the loss.

Differences, Finite, a calculus much used in actuarial work, which deals with a series of numbers by considering the differences of the successive terms.—Cf. Whittaker and Robinson, *Calculus of Observations*.

Diffraction, a term applied to the bending that rays of light undergo in passing close to the edge of an opaque

body. Thus when a beam of direct sunlight is admitted into a dark room through a narrow slit, and falls upon a screen placed to receive it, there appears a line of white light bordered by coloured fringes; these fringes are produced by diffraction, and in the case given it may be seen that the red or long-wave rays are diffracted more than the blue rays. See *Interference*.

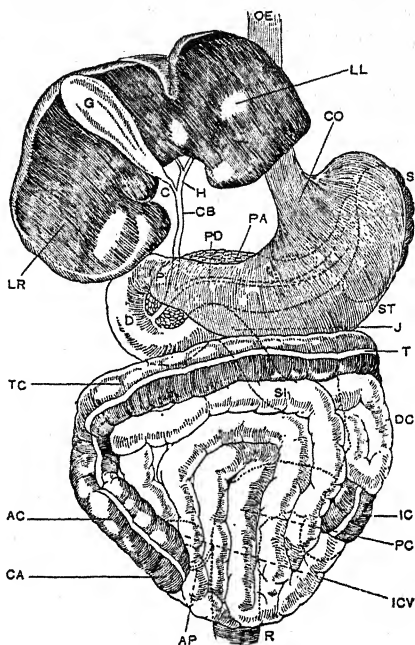
Diffusion, the gradual mixing of gases, liquids, or solids when brought into direct contact. When a block of lead is placed on a block of gold, with their smooth surfaces in close contact, it is found that, after several weeks, gold has diffused into the lead, and lead into the gold. In the case of gases, when a jar of oxygen and a jar of hydrogen are connected together by a tube or opening of any kind, they rapidly become mixed; and their mixture does not depend on gravity, but takes place in opposition to that force, as may be shown by placing the jar of hydrogen gas above the other. Similarly, if two vessels, one containing oxygen and the other hydrogen, be connected by a tube which is stuffed with a plug of porous material, such as plaster of Paris, the gases gradually diffuse one into the other through the porous plug. The two gases, however, do not pass through the porous separator at equal rates, but in *inverse proportion to the square roots of the densities of the gases*. Kindred phenomena occur when two liquids that are capable of mixing, such as alcohol and water, are put in contact, the two gradually diffusing one into the other in spite of the action of gravity.

Digby, Sir Kenelm (1603–1665), English author. He wrote numerous works: a *Treatise on the Nature of Bodies*, a *Treatise on the Nature and Operation of the Soul*, and *Of the Cure of Wounds by the Powder of Sympathy*.

Digester. See *Boiling-point*.

Digestion is that process in the animal body by which the aliments are so acted upon that the nutritive parts are prepared to enter the circulation, and separated from those which cannot afford nourishment to the body. The organs effecting this process are called the *digestive organs*, and consist of the stomach, the great and small intestines, &c. (see *Intestine; Stomach*), the liver, and pancreas. When the aliments, after being properly prepared and mixed with saliva by mastication, have reached the stomach, they are intimately

united with a liquid substance, called the *gastric juice*, by the motion of the stomach,



Semi-diagrammatic View of the Alimentary Canal

The Liver is turned up so as to show its lower surface.

OE, Esophagus CO, Cardiac Orifice of Stomach. ST, Stomach. P, Pylorus. D, Duodenum. J, Commencement of Jejunum—shown by dotted line behind Stomach and Transverse Colon. SI, Small Intestine. ICV, Ileo-cæcal Valve at junction of Small Intestine SI with Large Intestine. AC, Ascending Colon (large intestine). CA, Cæcum. AP, Appendix, shown by dotted line behind Small Intestine. TC, Transverse Colon. T, Tænia. DC, Descending Colon, shown dotted behind Small Intestine. IC, Iliac Colon (large intestine). PC, Pelvic Colon, shown dotted behind Small Intestine. R, Rectum. LR, Right Lobe of Liver. LL, Left Lobe of Liver. G, Gall Bladder. C, Cystic Duct. H, Hepatic Ducts. CB, Common Bile Duct. PD, Pancreatic Duct running along length of Pancreas and joining Common Bile Duct as shown. PA, Pancreas, shown partly by dotted line behind Stomach. S, Spleen, shown partly by dotted line behind Stomach.

By this motion the aliments are mechanically separated into their smallest parts, penetrated by the gastric juice, and transformed into a uniform pulpy or fluid

mass. The gastric juice acts upon the albuminous parts of the food, converting them into peptones, which can pass through organic membranes and thus enter the blood. This action is aided by the warmth of the stomach. The pulpy mass, called *chyme*, proceeds from the stomach, through the pylorus, into that part of the intestinal canal called the small intestine, where it is mixed with the pancreatic juice, bile, and intestinal juice. The pancreatic juice converts starch into sugar, albumins into peptones, and emulsifies fats, so that all these kinds of food are rendered capable of absorption. The process is aided by the intestinal juice. The bile also acts upon fats, and thus the food is formed into the *chyle*, which is absorbed into the system by the capillary vessels called *lacteals*, while the non-nutritious matters pass down the intestinal canal and are carried off. — BIBLIOGRAPHY: F. Hare, *Food Factor in Disease*; A. E. Taylor, *Digestion and Metabolism*.

Digitalin, a yellowish-white, odourless powder with a bitter taste, prepared from the leaves of *Digitális purpurea*. It is much used in medicine, and its action is similar to that of digitalis leaves but is not cumulative.

Digitalis, a genus of plants, nat. ord. Scrophulariaceae, containing about twenty species of tall herbs, natives of Europe and Western Asia. The purple foxglove (*D. purpurea*) is a common wild flower in Britain. In pharmacy, digitalis is employed to increase the activity of cardiac muscle tissue, to elevate blood pressure, and to relieve venous congestion. Care must be taken if it is used for any length of time.

Dijon, a town in Eastern France, capital of the department of Côte-d'Or, in a fertile plain at the foot of a range of vine-clad slopes. At some distance it is surrounded by a series of forts. It has many fine buildings, and there are important educational institutions, including a university. The industries are connected with woollens, hosiery, candles, mustard, vinegar, chemicals, paper-hangings, tanneries, foundries, machine factories, cotton- and oil-mills. The trade is considerable, particularly in the wines of Burgundy. Pop. 78,578.

Dike, or **Dyke**, an embankment raised to oppose the incursions of the sea or of

a river, the dikes of Holland being notable examples of work of this kind. These are often raised 40 feet above the high-water mark, and are wide enough at the top for a common roadway or canal, sometimes for both. See *Embankment*.

Dike, or **Dyke**, in geology, a term applied to intrusive igneous masses, such as basalt, which fill up veins and fissures in the other rocks, and sometimes project on the surface like walls through their superior resistance to weathering.

Dilke, Sir Charles Wentworth (1843-1911), English writer and politician. He was Under-Secretary for Foreign Affairs, President of the Local Government Board, &c. *The Present Position of European Politics and Problems of Greater Britain* are among his works.

Dillon, John (1851-1927), Irish politician and agitator. In 1918, after the death of John Redmond, he was elected chairman of the Irish Nationalist party, which, however, owing to the rise of the Sinn Féin party, was a nominal distinction only.

Dilly, the port of the Island of Timor, Dutch East Indies.

Dilman, a town, Persia, province of Azerbaijan. Pop. estimated at 15,000.

Dilolo, a small lake in Angola, near the southern boundary of Belgian Congo, regarded as the source of the Zambesi.

Dimensions, Physical. One of the aims of physical science is to express all its measurements in terms of the three fundamental units of length, mass, and time. A velocity, for example, is specified by the number of units of length traversed in the unit of time, so that we may write $v = l \div t$, or $v = lt^{-1}$. On this account velocity is said to have the dimensions LT^{-1} . Similarly, acceleration, being velocity added per unit time, has the dimensions of velocity \div time, or LT^{-2} ; and force, being proportional to mass and acceleration jointly, has the dimensions MLT^{-2} .

When a physical law is expressed as an equation connecting the numbers of units of the quantities involved, every term in this equation must be of the same dimensions in any one of the fundamental units. This is the *Principle of Dimensions*, first stated by Joseph Fourier, founder of the theory of the conduction of heat. In order to see its truth, we have only to observe that an equation containing terms of

different dimensions would give inconsistent results if the units of length, &c., were varied.

The principle of dimensions provides therefore a useful check on the accuracy of formulae. But it does much more than this. It often gives very valuable information about the relations of physical phenomena in cases where these relations are far too complicated to be completely worked out by mathematical analysis. To mention but one example, it is by the use of this principle that modern naval architecture is able to predict the behaviour of ocean-going ships from experiments in ponds on small-scale models.

Dimotika, a town in Thrace, on the River Maritza, 20 miles south of Adrianople. Pop. 8000.

Dinajpur, a town, India, Bengal, capital of a district of same name; pop. 16,000.—The district covers an area of about 4118 sq. miles; pop. 1,687,860. It is an important rice-growing district, and also produces rape, mustard, and sugar-cane.

Dinan, a town, France, department of Côtes-du-Nord (Brittany), on the Rance. There is a small trade, and barges are built. It is surrounded by walls. Pop. 11,410.

Dinant, a town, Belgium, in the province of Namur, situated on the Meuse. It is one of the most popular Belgian summer-resorts. Pop. 7690.

Dinapore, a town, India, Patna district, Bengal, on the right bank of the Ganges, cantonment and military headquarters of the district, with extensive barracks. Pop. 31,025.

Dinas Bricks, an infusible kind of brick made of a peculiar rock, containing 98 per cent of silica, with a little alumina, which occurs at Dinas, in South Wales.

Dindigul, a well-protected town of India, Madura district, Madras. It has manufactures of cigars and silk. Pop. 21,000.

Dindings, The, two small islands, also called **Pangkor Islands**, in the Straits of Malacca, belonging to the Straits Settlements, off the coast of Perak (British). The name now includes a strip of territory on the Malay Peninsula opposite; total area, about 265 sq. miles, two-thirds of which is covered by dense forests. Coco-nuts, coffee, and pepper are grown with success. Lumut, on the mainland, has a fine natural harbour.

Dindorf, Karl Wilhelm (1802–1883), German classical scholar. His chief publications were editions of the Greek dramatists (*Poetae Scenici Graeci*) and works elucidative of them and other Greek writers.

Dingo, the native wild dog of Australia (*Canis Dingo*), of a wolf-like appearance and extremely fierce. In habit the dingo is rather fox-like. It is very destructive to sheep, killing more than it eats.

Dingwall, a royal burgh and seaport of Scotland, county town of Ross and Cromarty, on Cromarty Firth. The exports consist of timber and agricultural produce. Pop. (1931), 2554.

Dinoceras, a fossil mammal found in the Eocene strata of North America, in some respects akin to the elephant and of equal size, but without a proboscis.

Dinornis, an extinct genus of large wingless birds—classed with the small existing *Apteryx*. The bones of several species have been found in New Zealand. The largest must have stood 12 feet in height, several of its bones being at least twice the size of those of the ostrich. They do not appear to have become extinct until the seventeenth or eighteenth century. The natives buried the eggs with their dead.

Dinosauria, a group of extinct reptiles, allied to the lizards and the birds. While some were only 3 feet long, many were huge, *Atlantosaurus* being 115 feet long. The Dinosaurs were the dominant land animals of the Jurassic and Cretaceous periods.

Dinotherium, a genus of extinct gigantic proboscidean mammals, precursors of the elephants, the remains of which occur in Miocene formations in several parts of Europe.

Diocletian (Gaius Valerius Diocletianus, surnamed *Jovius*) (245–313), Roman emperor, proclaimed A.D. 284. He was compelled by the dangers threatening Rome to share the government with M. Aurelius Valerius Maximian. In 292 Galerius and Constantius Chlorus were also raised to a share. As the result of his reconstitution of the empire there followed a period of brilliant successes in which the barbarians were driven back from all the frontiers. In the latter part of his reign he was induced to sanction a persecution of the Christians.

Diodati, Giovanni (1576–1649), Italian Protestant divine. He is celebrated for his translation of the Bible into Italian (1607).

Diodorus Siculus, Greek historian in the time of Julius Cæsar and Augustus. His universal history occupied him thirty years, and consisted of 40 books, but only books 1–5 and 11–20, with certain fragments, are now extant.

Diœcious, in botany, a term applied to plants which have flowers with stamens on one individual and those with pistils on another, e.g. willow.

Diôgenes Laërtius, author of a sort of history of philosophy in Greek, appears to have been born at Laerte, in Cilicia, and to have lived towards the close of the second century after Christ; but no certain information exists either as to his life, studies, or age. The work is divided into ten books, and bears in MSS. the title, *On the Lives, Doctrines, and Apotheisms of those who have distinguished themselves in Philosophy*.

Diôgenes of Sinopë (on the Black Sea) (412–323 B.C.), the most famous of the Cynic philosophers. Like his master Antisthenes, he despised all philosophical speculations, and opposed the corrupt morals of his time; but while the stern austerity of Antisthenes was repulsive, Diôgenes exposed the follies of his contemporaries with wit and good humour. As an exemplar of Cynic virtue he satisfied his appetite with the coarsest food, practised the most rigid temperance, walked through the streets of Athens barefoot, without any coat, with a long beard, a stick in his hand, and a wallet on his shoulders, and by night, according to the popular story, slept in a tub (or large earthenware vessel). His enemies accused him of various scandalous offences, but there is no ground for supposing him guilty of any worse fault than that of elevating impertinence to the rank of a fine art.

Diomed Islands, a group of islands in Behring Strait, between Alaska and Siberia. The border-line between Asia and America runs between them. Pop. about 80 Eskimos.

Diomedes, in Greek mythology, (1) the son of Mars and Cyrene, and King of the Bistônes in Thrace, who fed his horses on human flesh. He was killed by Hercules, who carried off the horses. (2) One of the

heroes at the siege of Troy, the son of Tydeus and Deipyle, and King of Argos, one of the suitors of Helen. After she was carried off, Diomedes engaged in the expedition against Troy, in which his courage and the protection of Pallas rendered him one of the most distinguished heroes.

Dionæa, a genus of plants, nat. ord. Droseraceæ. Only one species is known, *D. muscipula* (Venus's fly-trap), a native of the sandy savannas of Carolina and Florida.

Dion Cassius, or **Dio Cassius** (A.D. 155–?), Greek historian. In 219 he was raised to the consulship, and about 224 became Proconsul of Africa. The most important of his writings, though only a small part is extant, is a *History of Rome*, written in Greek and divided into eighty books, from the arrival of Æneas in Italy and the foundation of Alba and Rome to A.D. 229.

Dion Chrysostom (A.D. 50–110), Greek sophist and rhetorician. Eighty of his orations (in excellent Attic) have been preserved.

Dionysius of Halicarnassus (70–6 B.C.), Greek historian. He went to Rome about 30 B.C., where he wrote his *Roman Antiquities*, in twenty books, in which he relates (in Greek) the early history of Rome and its government up to the times of the First Punic War. We have the first nine books of this work entire, the tenth and eleventh nearly so, and some fragments of the others.

Dionysius the Areopagite, a convert to Christianity by the Apostle Paul about the middle of the first century, and the first Bishop of Athens, where he suffered martyrdom. Certain writings formerly ascribed to him consist of obscurely-written treatises on mystical subjects. Scotus Erigena translated them into Latin.

Dionysius the Elder (430–367 B.C.), tyrant or absolute ruler of Syracuse. He extended his rule over other cities in Sicily; and after some successes and reverses in the struggle with the Carthaginians, he gained a complete victory over them under the walls of Syracuse. In 368 he commenced a new war against the Carthaginians, but failed to drive them entirely out of Sicily.

Dionysius the Little (d. c. A.D. 545), a Scythian monk, celebrated as the first

to introduce the computation of time from the Christian era.

Dionysius the Younger, tyrant of Syracuse, succeeded his father, Dionysius the Elder, in 367 B.C. Timoleon, who came to Syracuse with aid from Corinth against the Carthaginians, deposed him in 344 B.C. He was carried to Corinth, where he is said to have gained a living by giving lessons in grammar.

Dionysus, the original Greek name of the god of wine, the name Bacchus (q.v.), by which he was also called both by the Greeks and the Romans, being at first a mere epithet or surname.

Diophantus of Alexandria, the first Greek writer on algebra, flourished probably about the middle of the third century after Christ. He is called the Father of Algebra, and left behind him thirteen books of *Arithmetical Questions*, of which only six are extant, and a work on *Polygonal Numbers*. An important section of the modern Theory of Numbers is called Diophantine analysis in honour of Diophantus.

Diopside, a calcium magnesium silicate, of the pyroxene series, occurring in igneous rocks and altered limestones, with a vitreous lustre, and of a pale-green, or a greenish- or yellowish-white colour.

Diopsis, a genus of two-winged flies, of which the species are native to India and Africa.

Dioptase, emerald copper ore, hydrated silicate of copper, a translucent mineral, occurring crystallized in six-sided prisms. It occurs in Siberia, Hungary, and Chile.

Diorite, a coarsely crystalline igneous rock, sometimes of a whitish colour speckled with black or greenish-black, consisting of hornblende and calcium sodium feldspar.

Dioscoreaceæ, a natural order of monocotyledons, of which the typical genus, including the yam, is *Dioscorea*. Black bromeliad is the only British representative.

Dioscorides, Pedanius (first century A.D.), Greek physician. He was the author of a celebrated work on *materia medica*, in five books, particularly valuable in regard to botany.

Diospyros, a large genus of trees or shrubs, natives of the warmer regions of the world, nat. ord. Ebenaceæ. The trees of this genus supply ebony wood. The Chinese date-plum (*D. kaki*) is an apple-

like tree which produces large red fruits resembling tomatoes.

Dip, of the horizon, the angle of depression of the visible horizon at sea below the true horizontal direction, due to the height of the eye above the level of the sea. The dip in minutes of arc is approximately equal to the square root of the height in feet.—*Dip*, magnetic, or *Inclination*. See *Dipping Needle*.

Dip, in geology, the inclination or angle at which strata slope or *dip* downwards into the earth. The degree of inclination or amount of the dip, which is easily measured by a *clinometer*, is the steepest angle made with a horizontal plane by a line drawn in the surface of the stratum.

Diphtheria is an acute infectious disease characterized by the formation of membrane in the throat and air-passages. It is most common in children. Infection is carried by milk, defective drains, while domestic animals, especially cats, are often the cause of the spread of the disease. The onset is slow, but its course is rapid. An attack comes on with fever, headache, occasional vomiting, and some degree of sore throat. The throat is at first merely inflamed, and later covered with white spots. This white membrane if untreated may spread over the throat, uvula, and palate. To ensure correct diagnosis a swab is taken from the throat and examined bacteriologically. At all stages of the disease, particularly at the beginning, there is danger of heart failure. Treatment by antitoxin is by far the most effective. This should be given as early as possible, the doses being regulated by the severity of the attack. Recovery is often slow.

Diplomacy, the science or art of foreign politics. The word, borrowed from the French, was first used in England in 1796 by Burke. The Cardinal de Richelieu is generally considered as the founder of modern diplomacy, though Machiavelli has some claims to be so considered. As a uniform system, however, with a fixed international status, diplomacy was only established in the nineteenth century at the Congresses of Vienna (1815) and Aix-la-Chapelle (1818).—**BIBLIOGRAPHY**: D. J. Hill, *History of Diplomacy in the International Development of Europe*; E. C. Grenville-Murray, *Embassies and Foreign Courts: a History of Diplomacy*.

Diplomatic Service, The. The diplo-

matic service of Great Britain, controlled by the Foreign Office, includes (1) ambassadors and (2) envoys and ministers plenipotentiary, both of which ranks represent the person of their sovereign and enjoy numerous special privileges in the country to which they are sent. Of lower standing are (3) ministers resident and (4) *chargés d'affaires*; the last named are accredited, not to a sovereign, but to his foreign minister, and frequently act merely as temporary substitutes for an ambassador. Secretaries of more than one grade, with naval, military, and, of late years, commercial attachés, also form members of an embassy. Candidates for the British diplomatic service require a nomination from the Foreign Secretary, must be between the ages of nineteen and twenty-five, and are subjected to an examination.

Diplozoon, a parasitic trematode worm which infests the gills of the bream, and which appears to be formed of two distinct bodies united in the middle.

Dipnoi. See *Ichthyology*.

Dippel's Oil, a pharmaceutical preparation obtained by the destructive distillation of animal matter, such as horn, ivory, blood. The crude form was refined by Dippel (1672-1734), the German alchemist, and at one time was a good deal used in medicine as a diaphoretic and hypnotic.

Dipper, a bird of the genus *Cinclus*, allied to the wrens. The common dipper, water-ouzel, or water-crow (*Cinclus aquaticus*), is a familiar European bird; it is about 7 inches in length. The male has the upper part of the body dark brown, the throat and breast white, belly rusty. The dipper frequents streams, and feeds largely on water-insects and larvæ.

Dipping-needle, or **Inclination Compass**, an instrument for showing the direction of the earth's magnetic force. In essentials the instrument consists of a light magnetized steel bar supported on a horizontal axis which passes, as nearly as possible, through the centre of inertia of the bar. When a needle thus mounted is placed anywhere not in the magnetic equator, it dips or points downward, and shows the direction of the magnetic force. The angle between the magnetic axis of the dipping-needle and the horizontal is called the dip or inclination. This varies

from 90° at the magnetic poles to 0° at the magnetic equator.

Diptera, two-winged flies, an order of insects embracing a vast number of species, of which about 40,000 have been named. The two transparent wings correspond to the fore-wings of other insects, the hind-wings being often represented by small club-shaped structures (halteres or balancers). There are two large compound eyes, and the mouth-parts are often modified for piercing and sucking. There is a well-marked metamorphosis, the larvæ being usually limbless maggots. The Diptera include many agricultural and horticultural pests, and a number are notorious as disease carriers.

Dipteris, a genus of Leptosporangiate ferns, section *Mixtæ*, formerly included in *Polypodium*, but now recognized as the sole living genus of the *Dipteridinae*.

Dipterocarpaceæ, an important order of Asiatic dicotyledonous trees, allied to the mallows (Malvaceæ). The different species produce a number of resinous, oily, and other substances.

Dir, a territory, North-West Frontier Province, India, in the Dir, Swat, and Chitral political agency. It is mountainous, wooded, and well watered. The soil is fertile, and rich crops are grown. Timber is exported. Area, about 5000 sq. miles.

Directors, persons elected to meet together at short fixed intervals and consult about the affairs of corporations or joint-stock companies, and to advise and assist the manager. Directors are appointed by a general meeting of the shareholders in the undertaking, and a certain number of them, usually a third, retire every year. The duties and responsibilities of directors are defined by the constitution of the company, or by the various Acts of Parliament affecting joint-stock and other companies.

Diredawa, a town, Abyssinia, 215 miles north-east of Addis Ababa. It is on the railway to Jibuti. Pop. 30,000, including 300 Europeans.

Dirk-Hartog Island, on the west coast of Australia, 45 miles long and 10 miles broad.

Discipline, **Books of**, two books connected with the Church of Scotland. The *First Book of Discipline* was drawn up by John Knox and four other ministers, and laid before the General Assembly in 1560. Another similar document, the

Second Book of Discipline, was prepared and sanctioned by the General Assembly of 1578, and has from that time been recognized as the authorized standard of the Church of Scotland in respect of government and discipline.

Disco, an island off the west coast of Greenland, with a good harbour at Godhavn on the south. It is mountainous throughout its entire length of 90 miles, and contains rich coal deposits.

Discomycetes, a large section of the ascomycetous Fungi, including many important genera.

Discophora, (1) a sub-class of the Hydrozoa, comprising most of the organisms known as sea-jellies, jelly-fishes, and sea-nettles; (2) leeches (q.v.).

Discount, the charge made by a banker for interest of money advanced by him on a bill or other document not presently due. In advancing money on such a security the banker deducts the charge for interest on his advance from the total amount represented on the security, pays the difference, which is called the *proceeds* of the bill, to the person parting with it, and collects the full amount to reimburse himself for outlay and interest at maturity. When a bill which has been *discounted* is paid by the acceptor before it is due, the discount allowed for prepayment is called *rebate*.

Discus, **Disc**, or **Disk**, among the Greeks and Romans, a quoit of stone or metal, convex on both its sides, sometimes perforated in the middle. The players aimed at no mark, but simply tried to throw the quoit to the greatest possible distance.

Disestablishment, the severance of connexion between Church and State, with the resultant emancipation of the Church from civil control. The Church of the West Indies was disestablished in 1868, and all colonial Churches, with the exception of the Church in India, are now free from State authority. In 1869 an Act, taking effect two years later, was passed for the disestablishment of the Church of Ireland. In France all recognition of Roman Catholicism as the State religion ceased in 1905. In 1914 was passed a Bill for disestablishing the Church in Wales, though its effect was, owing to the war, deferred till 1920 by the Suspensory Bill. See *Scotland*.

Disinfection, the means employed for

killing the germs of infectious or contagious disease by physical or chemical agencies. Ten minutes' boiling, or half an hour in hot air, kills all ordinary disease germs, but a longer exposure is necessary to kill germs (especially those of putrefaction) which form spores (see *Bacteria*). The most important chemical agents are chlorine, iodine, carbolic acid, bleaching powder, Condy's red fluid (containing permanganate of potash), perchloride of mercury, formalin, and flavine. Carbolic acid is one of the most effective, needing, however, care in the handling, as it is very poisonous and in strong solution causes severe burns. A greater dilution than 1 part in 40 of water is useless as a disinfectant. For application to the skin, tincture of iodine is one of the readiest preparations. In cases of infectious disease the most important points are the immediate disinfection of all the excretions of the patient. Expectoration should be received into a sputum-cup containing 1-20 carbolic acid. Soiled handkerchiefs should also be treated with carbolic acid. The personal linen and sheets of the patient should be placed in carbolic acid (1-40) in a slop-pail, and should be boiled before being sent to the laundry. All plates, spoons, &c., used for the patient's food should be boiled or scalded immediately after use. The excretions of the bowels or kidneys should be treated with bleaching powder. At the close of the illness all bedding should be handed over to the local authorities for the necessary disinfection.

Dismal Swamp, a large tract of marshy land in America, beginning a little south of Norfolk, in Virginia, and extending into North Carolina, containing 150,000 acres; 30 miles long and 10 miles broad. In the midst of the swamp is a lake, called *Drummond's Pond*, 7 miles in length. A navigable canal through the swamp connects Chesapeake Bay and Albemarle Sound.

Dispensation is the act by which an exception is made to the rigour of the law in favour of some person. The Pope may release from all oaths or vows. In England the monarch's claim to dispensing power was abolished by the Bill of Rights. The power of commuting sentences in capital cases is the only form in which the dispensing power of the Crown still exists.

Dispersion of Seeds and Fruits. The

chief agents of dispersal are wind and animals. Very minute seeds, like those of orchids, are carried away by the gentlest air-currents. Larger wind-borne seeds are *winged*, as in the pine, most Bignoniaceæ, &c.; or provided with a tuft of hairs acting as a *parachute*, as in willow, willow-herb, cotton, &c. Winged *fruits* are exemplified by ash, elm, sycamore, many docks, &c.; parachute *fruits* by Compositæ, Clematis, cotton-grass, &c. In the case of animal dispersal, the whole fruit is usually involved, being either *edible*, with hard indigestible seeds which are cast up or voided with excreta (fleshy fruits), or *hooked* so as to adhere to fur or wool, as in bidens, cleavers, enchanters' nightshade, and other 'burs'.

Dispersion, in optics, the angular separation of light rays of different colour, that is, of different wave-length. Dispersion may be caused either by refraction or by diffraction. When a beam of composite light passes obliquely from air into a second transparent medium, each constituent of the light is bent or refracted through a different angle from the original direction of the beam, with the result that the different colours are separated fan-wise, or dispersed at the surface of the second medium. In the refraction spectrum of white light, when caused by passage through a glass prism, the red rays are least deviated and the violet rays most deviated, if we consider only the visible spectrum. The difference of the angles of deviation for two selected rays measures their dispersion, and if this angle is divided by the deviation of the mean ray, we obtain the dispersive power of the prism. Transparent media vary in their dispersive powers; for example, carbon disulphide has more than three times the dispersive power of crown glass. The true nature of dispersion was first demonstrated by Newton. Achromatic lenses cause deviation without dispersion, and direct-vision spectroscopes cause dispersion with no deviation of the central part of the spectrum. The dispersive power is not the same for all parts of a refraction spectrum; besides, the same colours do not occupy the same positions in spectra formed by prisms of different material; consequently, such spectra are called *irrational*, and the property is known as the *irrationality of dispersion*. In the diffraction spectrum, the order of the colours

is reversed, red undergoing the greatest deviation; also, the deviation for a given colour is nearly proportional to the wave-length. The diffraction spectrum is therefore termed a *normal spectrum*.

All substances do not give the same order of colours in their spectra; certain exceptions are known in which the usual order of the colours is changed. Christian-sen showed that an alcoholic solution of fuchsine gave a spectrum containing only violet, red, and yellow; the violet is least refracted, and the yellow most, and a dark band lies between the violet and the red. This has been called *anomalous dispersion*, and similar effects have been observed in iodine and sodium vapours, and in solutions of colours derived from aniline which exhibit surface colour.—**BIBLIOGRAPHY:** T. Preston, *Theory of Light*; E. Edser, *Light for Students*; P. Drude, *Theory of Optics*.

Displacement. In hydrostatics a body immersed in a liquid displaces a certain volume of the liquid, and the upthrust of the liquid in the body is, by the principle of Archimedes, equal to the weight of liquid displaced (see *Hydrostatics*). It follows that, in the case of a floating ship, the weight of the ship is equal to the weight of water displaced. This weight is called the *displacement of the ship*, and is measured in tons.

Disraeli, Benjamin. See *Beaconsfield*. **D'Israeli**, Isaac (1766–1848), English man of letters. An anonymous reply to Peter Pindar, entitled *On the Abuse of Satire*, was followed between 1791 and 1793 by the appearance of his *Curiosities of Literature*. His *Essay on the Literary Character* was published in 1795. Between 1812 and 1822 appeared his *Calamities of Authors, Quarrels of Authors, and Inquiry into the Literary and Political Character of James I.* In 1841 he published a selection from his MSS. under the title of *Amenities of Literature*.

Disruption, the name commonly applied in Scotland to the act by which, in 1843, 474 ministers and professors of the Established Church gave up their livings. See *Free Church*.

Diss, a town, England, Norfolk. It has manufactures of brushes and mats. Pop. (1931), 3422.

Disseizin, or *Disseisin*, in law, is the dispossessing one of a freehold estate, or interrupting his *seisin*. Of freeholds only

can a seizin be had, or a disseizin done. Whether an entry upon lands is or is not a disseizin, will depend partly upon the circumstances of the entry, and partly upon the intention of the party as made known by his words or acts.

Dissenters, the common name by which in Britain all Christian denominations, excepting those of the Established Churches, are usually designated, though in Acts of Parliament it generally includes only Protestant dissenters, Roman Catholics being referred to under their specific name.

Dissociation. Certain substances tend to break down into simpler substances with change of temperature; thus ammonium chloride on heating gives a mixture of hydrochloric acid (HCl) and ammonia (NH₃), and on cooling these substances recombine to give ammonium chloride (NH₄Cl) again.

Distemper, a disease of the dog commonly considered as of a catarrhal nature. In most cases a running from the nose and eyes is one of the first and chief symptoms, the defluxion becoming after some time mucous and purulent. The animal is subject to violent fits of coughing combined with vomiting, loses its appetite, its flesh begins to waste, and if the disease be virulent, symptoms of affection of the brain manifest themselves, accompanied by fits, paralysis, or convulsive twitchings.

Distemper, in painting, a preparation of colour mixed with size, yolk of egg or white of egg. Prepared with size, it is used chiefly in scene painting and household decorations, but in other forms it is much used for easel and mural paintings. Before the introduction of oil as a medium in the fifteenth century, fresco and distemper were the principal methods of painting. Distemper is usually but not necessarily applied to a dry ground, fresco always to a wet.

Distillation, the volatilization and subsequent condensation of a liquid in an apparatus known as a *still* and heated by a fire or flame. The operation is performed by heating the crude liquid or mixture in a retort or vessel known as the *body of the still*. This is made of various shapes and materials, and is closed, with the exception of a slender neck which opens into the condenser, a long tube through which the hot vapour from the still is passed. The tube is kept at a

sufficiently low temperature to cause the vapour to condense, the common method of securing this being to surround the tube with a constantly renewed stream of cold water. In some cases ice or a freezing mixture may be required to effect condensation. In a large-scale apparatus the condensing tube is coiled round and round in a tub or box, and is known as a *worm*. From the end of it the vapour condensed into a liquid drops into a receiver. The simplest case of distillation is that of water containing solid matter in solution, the solid matter remaining behind in the still or retort, while the water trickles pure into the receiver through a worm made of block-tin, as most other metals are attacked by distilled water. When the mixture to be distilled consists of two or more liquids of different boiling-points, such as alcohol and water, the more volatile comes off first, accompanied by a certain proportion of the vapour of the other, so that it is hardly possible completely to separate bodies by one distillation. When the production of one of the ingredients only is aimed at by this process, it is called *rectification*, but when it is desired to separate and collect all the liquids present, or to divide a mixture into portions which volatilize within certain ranges of temperature, the process is called *fractional distillation*. The distillation of whisky has long been familiar in Scotland, Ulster, and the Irish Free State, and, when performed by means of the old *pot-still*, is a simple operation indeed. On the large scale a more elaborate apparatus is employed, and for alcohol of a cheap class Coffey's or other patent still is much used. Copper is the metal that suits best as the material for the stills used in distilling whisky. Sea-water is distilled in many cases for drinking or cooking purposes. This water is, of course, very pure, but its taste is far from agreeable. In *destructive distillation*, or *dry distillation*, the original substance is so treated that products are obtained which were not present uncombined in the original material (see *Coal-tar*). Wood is distilled partly for the sake of the pyroligneous acid and the tar, partly for the charcoal. Bones are distilled for the sake of the charcoal, though the oil is also collected. Shale is distilled both for the oil and for the paraffin wax, ammonia, &c., obtained.

Distinguished Conduct Medal, a

medal instituted in 1854 under the name of the Meritorious Service Medal as "a mark of the Sovereign's sense of the distinguished service and gallant conduct in the field of the army then serving in the Crimea". It is given to warrant-officers, non-commissioned officers, and privates. Bars may be awarded for additional deeds of gallantry; in service uniform the possession of a bar is indicated by a silver rosette worn on the ribbon. The letters D.C.M. are placed after the name of the recipient. See Plate, *Medals and Decorations*.

Distinguished Flying Cross, a decoration instituted during the European War, and awarded to officers and warrant-officers of the Air Force for acts of gallantry when flying in active operations against the enemy. The letters D.F.C. are placed after the name of the recipient. A corresponding medal, the Distinguished Flying Medal, is awarded to non-commissioned officers and men. See Plate, *Medals and Decorations*.

Distinguished Service Cross, a naval decoration formerly known as the Conspicuous Service Cross, and instituted in 1901. It is awarded to naval officers below the rank of lieutenant-commander, and to warrant-officers, for services before the enemy. The letters D.S.C. are placed after the name of the recipient. See Plate, *Medals and Decorations*.

Distinguished Service Order, The, was instituted by Royal Warrant on 6th Sept., 1886. All commissioned officers of the Navy, Army, or Air Force are eligible to be appointed Companions of this order. Bars may be awarded for additional deeds of gallantry; in undress uniform the possession of a bar is indicated by a silver rosette worn on the ribbon. The badge of the order is a gold cross *patée* enamelled white, edged gold, having on one side thereof, in the centre, within a wreath of laurels enamelled green, the Imperial crown in gold upon a red enamelled ground, and on the reverse, within a similar wreath and on a similar red ground, the Imperial and Royal cipher (G.R.I.). The letters D.S.O. are placed after the name of the recipient, who ranks between Commanders of the Order of the British Empire and Members of the Royal Victorian Order (4th class). See Plate, *Medals and Decorations*.

Distomum, a genus of trematode or

suctorial parasitic worms or flukes, infesting different animals and known as *cercaria*. *D. hepaticum*, the common liver fluke, when adult inhabits the gall-bladder or ducts of the liver in sheep, and is the cause of the disease known as the rot. It may also occur in cattle and man. The minute larvæ live in a small water-snail (*Limnaea truncatula*), from which they ultimately escape to encyst on grass, &c., by which sheep may become infested. The adults of other species of *Distomum* live within the bodies of various fishes, amphibia, reptiles, birds, and mammals.

Distress, in law, is the taking of a personal chattel of a wrong-doer or a tenant, in order to obtain satisfaction for the wrong done, or for rent or service due. If the party whose goods are seized disputes the injury, service, duty, or rent, on account of which the distress is taken, he may replevy the things taken, giving bonds to return them or pay damage in case the party making the distress shows that the wrong has been done, or the service or rent is due. Wrongful distress is actionable. Another kind of distress is that of *attachment*, to compel a party to appear before a court when summoned. The distresses most frequently made are on account of rent and taxes and *damage-feasance*.

Distribution is that part of the subject-matter of economics which deals with the division, among the individuals composing a community, of the product of their labour and of land and capital at their command. It has most social interest and importance, for in it there is a sharper conflict than anywhere else between economic considerations and ideals of social justice.

The present position is one of unresolved discord between the economic and the equalitarian schools. The economic analysis is based upon a division of the factors of production into three, viz. Labour, Capital, and Land. These are represented as competing among themselves for employment, which is given to each in accordance with the return which will be secured as a result of an addition to the amount already employed; the rewards of each fall roughly under the headings of Wages and Salaries, Interest and Rent, respectively. The demarcation cannot be exact. The fundamental assumption of the economists is that

competitive distribution is indispensable. Economists do not assume that men would not work at all if they were guaranteed a living wage whether they did or not, but that men would not work enough, and would be guided by personal idiosyncrasy. The only alternatives to a great falling off in national wealth are, in their view, either competitive distribution or enforcement of work by a rigid discipline, which would be as hard as the present system, while being less adaptable.

On the ground that the present system fails to justify the great inequalities in the distribution of wealth, idealist thinkers have propounded several theories. The two best known are: (1) the crude one in which absolute equality in distribution is demanded, and (2) where the claim is put forward that the community should be so organized that each member receives that which he needs, while giving in return work according to the best of his ability. The statement of the economic basis for these theories is generally associated with the name of Marx, who was, however, greatly influenced by English writers; but the driving force of the movement is moral and emotional.

Distringas, the process under the rules of the Supreme Court, whereby a person not the registered holder of shares or stock in any company, but beneficially interested therein, may put a restraint upon its transfer until his claim is satisfied.

Distrito Federal, a district of Mexico, including Mexico City. Area, 578 sq. miles; pop. (1921), 906,063.

Ditmarshes, a district of Holstein, in Germany, consisting of a monotonous flat stretching along the North Sea, between the mouths of the Elbe and the Eider, and so little raised above the sea as to require the protection of strong embankments. The area is 500 sq. miles, and the total pop. 96,373.

Dittany, the popular name of the plants of the genus *Dictamnus*, a herb of the rue family (Rutaceæ), found in the Mediterranean region. The whole plant is covered with oily glands, and the secreted oil is so volatile that in hot weather the air round the plant becomes inflammable.

Dittay, in Scots law, equivalent to indictment (q.v.).

Diu, a small island, 7 miles long, on the south coast of Kathiawar, India. It belongs to the Portuguese dependency of

Goa, and was formerly of great importance. The inhabitants (20,000) are mostly fishermen, though in the town of Diu there are several salt-works.

Divers, a family of swimming birds, characterized by a strong, straight, rather compressed, pointed, long bill; a short and rounded tail; short wings; thin, compressed legs, and the toes completely webbed. They prey upon fish. The leading species are the great northern diver (*Colymbus glacialis*), the red-throated diver (*C. septentrionalis*), and the black-throated diver (*C. arcticus*). These birds inhabit the Arctic seas of the New and Old Worlds; they are abundant in the Hebrides, Norway, Sweden, and Russia.

Dividend, the interest or profit of stocks divided among, and paid to, the proprietors. No dividend must be paid except out of profit (Companies Act of 1862).

Dividing Range, Great, an Australian chain of mountains, forming the watershed between the rivers flowing into the Pacific and those running westward. It is situated at an average distance of 30 miles from the sea, and stretches from Cape York on the north to Wilson's Promontory on the south. The culminating point is Mount Townshend (7353 feet).

Divi-divi, the pods of *Caesalpinia coriaria*, a tree which grows in tropical America, and a member of the family which yields sapan, brazil, and other red woods. The pods are excessively astringent, containing a large proportion of tannic and gallic acid, for which reason they are used by tanners and dyers, and also in medicine. They are about one inch broad and three inches long.

Divination, the act of divining; a foretelling future events, or discovering things secret or obscure, by the aid of superior beings, or by other than human means. Cicero divided it into two kinds, *natural* and *artificial*, or *intuitive* and *inductive*. *Natural* divination was supposed to be effected by a kind of inspiration or divine afflatus; this method of divination is familiar as represented by oracles; *artificial* divination was effected by certain rites, experiments, or observations, as by sacrifices, observation of entrails and flight of birds (ornithomancy), of the behaviour of fishes (ichthyomancy), lots, omens, and position of the stars. Among modes of divination were: *axinomancy*, by axes; *belomancy*, by arrows; *bibliomancy*, by the

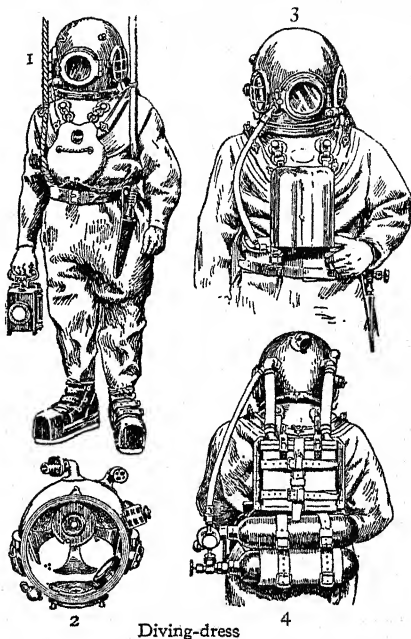
Bible; *oneiromancy*, by dreams; *pyromancy*, by fire; *hydromancy*, by water; *cascinomancy*, by observing the results of the turning of a sieve hung on a thread.

Divine Right, the claim set up by some sovereigns or their supporters to the absolute obedience of subjects as ruling by appointment of God. This doctrine, which came into general use in the seventeenth century, may now be considered to be exploded.

Diving-bell, a contrivance for the purpose of enabling divers to descend and to remain below the surface of water for a length of time. Diving-bells have been made of various forms, more especially in that of a bell or hollow truncated cone, with the smaller end closed, and the larger one, which is placed lowermost, open. The air contained within these vessels prevents them from being filled with water on submersion, so that the diver may descend in them and breathe freely for a long time, provided he can be furnished with a new supply of fresh air when the contained air becomes vitiated by respiration. Modern diving-bells are usually rectangular in shape, and have a trunk or tube on top reaching to the surface of the water, and fitted with an air-lock to enable men to go into or out of the bell without moving it from the bottom; they are fitted with telephones and electric lights. A form, called the *nautilus*, has been invented which enables the occupants, and not the attendants above, to raise or lower the bell, or move it about at pleasure.

Diving-dress, a waterproof dress of india-rubber cloth covering the entire body except the head. The dress has a neck-piece or breastplate to which the head-piece or helmet can be attached when wanted. Air is supplied by means of a flexible air-pipe to a non-return valve on the helmet, and is connected with an air-pump on the surface. Communication can be carried on by signals on the breast-rope between the diver and his attendant, or by telephone, which is usually fitted in the breast-rope. One form of diving-dress is elastic and hermetically closed. A reservoir containing highly compressed air is fixed on the diver's back. When he wishes to ascend, he simply inflates his dress from the reservoir. Another form, known as the *Fleuss dress*, also makes the diver independent of exterior aid. A diver

has remained for an hour and a half under 35 feet of water in this dress. The safe limit for diving is 200 or 300 feet, the deepest dive in this country being 210 feet; but great care must be exercised in



Diving-dress

1, Ordinary diving-dress with (2) helmet. 3, Front view and (4) back view of self-contained diving apparatus. Reproduced by courtesy of Messrs. Siebe, Gorman, & Co.

bringing the diver to the surface.—BIBLIOGRAPHY: C. W. Domville-Fife, *Submarine Engineering of To-day*; G. W. M. Boycott, *Compressed Air Work and Diving*.

Divining Rod, a rod, usually of hazel, with two forked branches, used by persons who profess to discover minerals or water under ground. The rod, if carried slowly along by the forked ends, dips and points downwards, it is affirmed, when brought over the spot where the concealed mineral or water is to be found. The present shape of rod does not seem to have come into use before the early sixteenth century.

Divisibility, that general property of bodies by which their parts or component particles are capable of separation. Numer-

ous examples of the division of matter to a degree almost exceeding belief may be easily instanced. Thus glass test-plates for microscopes have been ruled so fine as to have 225,000 spaces to the inch. Cotton yarn has been spun so fine that one pound of it extended upwards of 1000 miles. One grain of gold has been beaten out to a surface of 52 sq. inches, and leaves have been made 367,500 of which would go to the inch of thickness. Wires of platinum have been drawn out so fine as to be only the 30,000th part of an inch in diameter. The silk line, as spun by the worm, is about the 5000th part of an inch thick; but a spider's line is only the 30,000th part of an inch in diameter. The trituration and levigation of powders, and the perennial abrasion and waste of the surface of solid bodies, occasion a disintegration of particles almost exceeding the powers of computation. The solutions of certain saline bodies, and of other coloured substances, also exhibit a prodigious subdivision of matter. A single grain of sulphate of copper, or blue vitriol, will communicate a fine azure tint to five gallons of water. In this case the sulphate must be attenuated at least 10,000,000 times. Odours are capable of a much wider diffusion. A single grain of musk has been known to perfume a large room for the space of twenty years.

Division. See *Army*.

Division of Labour, the separation of the processes of production into a series of simple operations by which the cost of producing complicated articles may be immensely reduced. Less ability is required from the worker and time is saved, partly because by practice the operation is more quickly performed, and partly because the waste of the workers moving from one operation to another is avoided. By standardizing operations division of labour tends to the invention of machinery; increases the skill of the individual workman in one particular operation; enables skilled labour to be replaced by less skilled; makes a more economical use of capital possible; and brings about a more economical distribution of labour. There are, however, certain disadvantages; by increasing the worker's special skill his usefulness as an all-round workman is reduced, and his interest in his work is liable to be killed, thereby reducing the incentive to industry.

Divorce, a separation, by law, of husband and wife, which is either a divorce *a vinculo matrimonii*, that is, a complete dissolution of the marriage bonds, or a divorce *a mensâ et thoro* (from bed and board), whereby the parties are legally separated, but not unmarried. A divorce *a vinculo matrimonii*, for any cause arising subsequent to marriage, could formerly be obtained in England only by an Act of Parliament, and the ecclesiastical courts must have previously pronounced a divorce *a mensâ et thoro*. The Act passed in 1857, however, established a new court for trying divorce causes, called the Court for Divorce and Matrimonial Causes, since absorbed into the Probate, Divorce, and Admiralty Division of the High Court of Justice. According to present practice the husband may obtain a divorce for simple adultery; but if the wife is the petitioner, she must show that her husband has been guilty of certain kinds of adultery, or of adultery coupled with desertion or gross cruelty. Either party may marry again after divorce. A divorce cannot be obtained if it appear that the petitioner has been guilty of the same offence, or has been accessory to or has connived at the offence, or if there has been collusion between the parties to obtain a divorce, or if they have condoned the offence by living together as man and wife after discovery. The Act also abolished divorces *a mensâ et thoro*, substituting, however, judicial separations (see *Judicial Separation*). A decree for a divorce is always in the first instance a *decree nisi* (q.v.). A Matrimonial Causes Bill, introduced in the House of Lords in 1920, proposes to abolish the legal disabilities of a wife in this matter, and to grant divorce to husband or wife on any of the following grounds: (a) adultery; (b) desertion for at least three years; (c) cruelty; (d) incurable insanity coupled with at least five years' confinement under the lunacy laws; (e) incurable habitual drunkenness coupled with three years' separation under a temporary separation order granted on the ground of habitual drunkenness; and (f) imprisonment under a commuted death sentence. In Scotland, from the time of the Reformation, divorce might be obtained by either party on the ground of adultery, marriage being held to be only a civil contract, and as such under the jurisdiction of the civil courts. Con-

donation, or connivance, or collusion is sufficient to prevent a divorce from being obtained on the ground of adultery, but not recrimination, that is, a counter charge of adultery. Wilful desertion for at least four years is also held a valid reason for divorce. The action is carried on before the Court of Session. In other countries, including British colonies, the law relating to divorce varies greatly. In the United States of America marriage, though it may be celebrated before clergymen as well as civil magistrates, is considered to be a civil contract, and the laws as to divorce, and the facility or difficulty of obtaining it, differ greatly in the several states. In France divorce was legalized in 1884, with conditions, after having been prohibited for many years.—Cf. Bryce, *Marriage and Divorce*.

Diwaniyah, a division in the vilayet of Baghdad, 'Iraq. Pop. 204,500.

Diyala, a division in the vilayet of Baghdad, 'Iraq. Pop. 104,036.

Dizful, a town of Persia, on the River Dizful; a place of great trade and manufactures. Indigo is the main export, but Dizful is also noted for the manufacture of reed-pens. Pop. 35,000.

Djakova, a town of Montenegro, Yugoslavia, 53 m. N.E. of Scutari, an important frontier strategic point. Pop. 15,000.

Djambi, a division of the island of Sumatra; area, 18,719 sq. miles; pop. 233,344.

Djemal Pasha (1875-1922), Turkish soldier and politician. He commanded the Turkish forces in Palestine from 1915 to 1917. Accused in 1918 of various crimes, such as misappropriation of funds, and compelled to flee from Constantinople, he was condemned to death in his absence in 1919.

Djibouti. See *Jibuti*.

Djokdjokarta, a Dutch residency in the Island of Java, on the south coast, with a capital of the same name. Its forests abound in teak, and rice, coffee, and tobacco are extensively cultivated. It is ruled by a sultan who is dependent on the Dutch. Pop. 441,800. The town is the seat of the Dutch Resident. Pop. 97,058.

Dnieper, a great river of Russia which rises in the government of Smolensk, and flows to the Black Sea. It begins to be navigable a little above Smolensk, and has a total length of 1230 miles. Among its tributaries are the Beresina, the Pripet,

the Desna, and the Psiol. In its lower course there are important fisheries. Between Kiev and Alexandrovsk it forms a series of cataracts. The river trade is considerable. Through the Beresina Canal the Dnieper communicates with the Baltic Sea.

Dniester, a river of Europe (Poland, Romania, and Ukraine) which has its source in the Carpathian Mountains, and empties itself into the Black Sea after a course of about 750 miles. Navigation is difficult.

Doab, a name applied in India indiscriminately to any tract of country between two rivers. The tract between the Ganges and the Jumna is usually called the Doab.

Dobell, Sydney (1824-1874), English poet and man of letters. Among his works are: *Balder*, *Sonnets on the War*, and *England in Time of War*.

Döbeln, a town of Saxony, with a great trade in grain, and manufactures of cloth, yarn, leather, lacquered wares, and pianos. Pop. (1925), 22,508.

Döbereiner's Lamp, a contrivance for producing an instantaneous light, invented by Professor Döbereiner, of Jena, in 1824.

Dobrici, a town in Romania. It is situated on a small tributary of the Danube, and is on the Cernavoda-Constantza railway. Pop. 10,000.

Dobruja, a territory forming part of the kingdom of Romania, bounded by the Danube, the Black Sea, and Bulgaria (to which it belonged before 1878). Its area was increased to 8969 sq. miles after the Balkan War in 1918. There are some fertile spots, but on the whole it is marshy and unhealthy. The population is of various nationalities, Romanians, Bulgars, Greeks, Turks, and Jews. The inhabitants engage in tillage and stock-rearing. The principal towns are Kustendje and Tultcha. See *Romania*. Pop. 381,306.

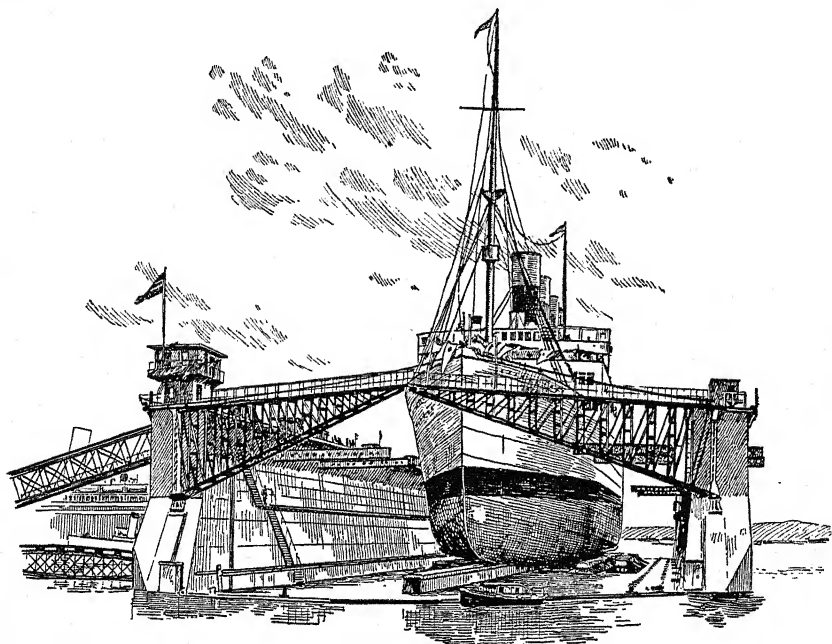
Dobson, Henry Austin (1840-1921), English poet. His earliest verses first appeared in book form under the title *Vignettes in Rhyme and Vers de Société* (1873). His other volumes of verse include: *Proverbs in Porcelain* (1877), *Old World Idylls* (1883), and *At the Sign of the Lyre* (1885). Among his prose works may be mentioned his lives of *Hogarth*, *Fielding*, *Steele*, *Goldsmith*, *Horace Walpole*, *Richardson*, and *Fanny Burney*; *Thomas Bewick and his Pupils*; and three

series of *Eighteenth Century Vignettes*.

Docetæ, the name given, in the earlier ages of the Church, to those who denied the reality of the human form of Christ, maintaining it to be merely a phantom or shadow.

Dock, a name applied to different plants of the genus *Rumex*, belonging to the rhubarb family (*Polygonaceæ*). These are large herbaceous plants, with stout roots,

painting, and repairing ships. The entrance is controlled by either gates or caissons. The ship having entered, the gates are closed, and the water pumped out, allowing the vessel to settle down gradually upon a row of keel blocks running up the centre-line of the dock. The sides of the docks are built in the form of large continuous steps, which support the ends of the timber shores which serve to keep the ship in an



Floating-dock, Southampton

alternate and often entire leaves, and bearing panicles of small greenish flowers.

Docks are artificial enclosures for the reception of shipping, for the purpose of loading, discharging, or repairs. Tidal docks or basins are open permanently to the main channel or river, and the water-level, therefore, varies with the rise and fall of the tide. Wet docks have a water entrance normally closed by gates or caissons, which permit the water-level of the enclosed area being maintained at high-water level. Dry or graving docks are used for the purpose of examining,

upright position. Floating docks fulfil the same functions as dry docks. In their modern form they consist of a hollow steel box or pontoon, carrying hollow longitudinal walls at each side. These walls contain the pumps and controlling machinery, the pontoon portion being capable of being filled with or emptied of water, thus raising or sinking the dock. This lower portion is subdivided into a great number of compartments, all of which may be filled separately, so that errors of trim can be corrected. In making use of this type the dock is lowered by

flooding the lower compartments. The ship is then floated into position and shored. The first wet docks constructed in England were those now called the Commercial Docks in London, which existed in a much less extensive form as early as 1660. In 1800 the West India Docks were constructed, and were followed by the East India Docks, Millwall Docks, London Docks, the St. Katharine Docks, and the Victoria Docks, affording, together with those at Tilbury, more than 600 acres of water accommodation. The most modern docks are the King George V Dock at London, and the Gladstone Dock at Liverpool. The other important British docks are those at Southampton, Bristol, Cardiff, Hull, Great Grimsby, Newcastle, Shields, Barrow, Leith, Glasgow, Dundee, &c. A floating dock at Southampton has a lifting capacity of 60,000 tons.—BIBLIOGRAPHY: W. Shields, *Principles and Practice of Harbour Construction*; L. V. Harcourt, *Harbours and Docks*.

Dock-warrants, orders for goods kept in the warehouses connected with a dock. They are granted by the proper officer at the dock to the importer in favour of any one that he may name. These warrants are held to be negotiable, so that they may pass from one holder to another, the property of them being always vested in the holder.

Dock-yards, establishments (under direct Admiralty control), supplied with all sorts of naval stores, materials and conveniences for the construction, repairs, and equipment of ships of war. In England the royal dock-yards are at Chatham, Sheerness, Portsmouth, Portland, and Devonport, besides the Deptford and Woolwich store-yards. There are also royal dock-yards or naval victualling yards at Berehaven in Bantry Bay, Invergordon, Simon's Town, Gibraltar, Malta, Bermuda, Bombay, Calcutta, Hongkong, Sydney, Halifax, Esquimaux, Singapore, and Colombo. Pembroke and Rosyth are now only care and maintenance basins.

Doctor, a term literally signifying teacher. It was first made an academical title by the University of Bologna. In England the Doctor's degree was introduced into the universities during the reign of John or Henry III. The doctorate was first given in the faculty of law; soon after it was given in divinity; though the word doctor is so commonly used as a

synonym for 'physician', doctors of medicine were not created until the fourteenth century. The doctorate is now also given in the faculties of music, letters, science, and philosophy. The title of Doctor is in some cases an honorary degree, and in other cases conferred after examination. The title of D.C.L. (Doctor of Civil Law), for example, at the Universities of Oxford and Durham, is frequently an honorary degree, and so also are those of D.D. (Doctor of Divinity) and LL.D. (Doctor of Laws) at various universities.

Doctors' Commons was a college founded in 1567 for the Doctors of the Civil Law in London, and was at one time the seat of the Court of Arches, the Archdeacon's Court, and the Court of Admiralty. The society dissolved in 1857.

Dodder, the common name of the plants of the genus *Cuscuta*, a group of slender, branched, twining, leafless pink or white annual parasites, nat. ord. Convolvulaceæ. Four species are common in England—*C. europæa*, found on nettles and vetches; *C. Epithymum*, on furze, thyme, and heather; *C. trifolii*, on clover; *C. Epilinum*, on cultivated flax.

Doddridge, Philip (1702–1751), English Dissenting divine. *The Rise and Progress of Religion in the Soul* and *The Family Expositor* are amongst his best-known works. Many of his hymns are still sung, such as *O God of Bethel, by whose hand and O happy day that fixed my choice*.

Dodecanese (Gr., twelve islands), a group of islands lying off the south-west coast of Asia Minor. The group, consisting of the Southern Sporades, includes the Islands of Patmos, Cos, Lipsos, and others near Rhodes. Italy obtained them in 1912 and was secured in possession of them all by the Treaty of Lausanne (1923).

Dodgson, Charles Lutwidge. See *Carroll, Lewis*.

Dodo (*Didus ineptus*), an extinct genus of birds once abundant on the Island of Mauritius, and assigned by naturalists to the order Columbæ or pigeons. It was a massive, clumsy bird, larger than a swan, covered with down instead of feathers, with short ill-shaped legs, a strong bulky hooked beak, and wings and tail so short as to be useless for flight. It probably became extinct soon after 1681.

Dodona, a celebrated locality of ancient Greece, in Epirus, where was one of the most ancient Greek oracles.

Dodsley, Robert (1703–1764), English poet, dramatist, and publisher. He planned the *Annual Register* (commenced in 1758); the *Collection of Old Plays* (12 vols. 12mo), which now chiefly sustains his name as a publisher; and the *Collection of Poems by Different Hands*.

Dog-days, the name applied by the ancients to a period of about forty days, the hottest season of the year, at the time of the heliacal rising of Sirius, the dog-star. The time of the rising is now, owing to the precession of the equinoxes, different from what it was to the ancients (1st July); and the dog-days are now counted from 3rd July to 11th Aug., that is, twenty days before and twenty days after the heliacal rising.

Doge, formerly the title of the first magistrates in the Italian republics of Venice and Genoa. The first doge of Venice elected for life was Paolo Anafesto, in 697; and in Genoa, Simone Bocconera, in 1339. In both cities the office was abolished by the French in 1797.

Dog-fish, a name given to several species of small shark. All members are voracious and destructive. The lesser spotted dog-fish (*Scyllium canicula*) is rarely 3 feet long. Its skin is used for polishing. The greater spotted dog-fish (*S. catulus*) is from 3 to 5 feet, and is blackish-brown in colour with dark spots. Their flesh is most unpalatable. The common dog-fish (*Acanthias vulgaris*), found in British and North American seas, is sometimes used for food. The tiger or zebra-shark (*Stegostoma tigrinum*) is a handsome dog-fish native to the Indian Ocean.

Dogger Bank, an extensive sand-bank near the middle of the North Sea. It commences about 36 miles east of Flamborough Head, and extends E.N.E. to within 60 miles of Jutland, in some places attaining a breadth of about 60 miles. In Oct., 1904, the Russian Baltic Squadron fired upon a British fishing-fleet on the Dogger, killing two men. The incident was settled by arbitration.

Doggett's Coat and Badge, the prize for a rowing-match which is held annually on the 1st Aug., the course being on the Thames from London Bridge to Chelsea. The match is open to six young watermen whose apprenticeship ends the same year, and the prize is a waterman's red coat bearing a badge which represents the

white horse of Hanover. It was instituted by the actor Thomas Doggett in 1716.

Dōgra, a race of Indian hillmen, descended from Rajputs, found in and recruited from the country comprised within a rough triangle having Jammu, Simla, and Chamba at its angles; or more generally still, between the upper waters of the Rivers Chenab and Sutlej. They are strict Hindus, but, as they are not so particular as the Brahmans and down-country Rajputs with regard to cooking, they are much more valuable as fighting men. The Dōgras make excellent soldiers, and there are three first-line battalions of them in the Indian army: the 37th, 38th, and 41st.

Dog-rose, the *Rosa canina*, or wild brier, nat. ord. Rosaceæ. It is a common British plant, growing in thickets and hedges. The fruit is known as the hip.

Dogs. The origin of the dog is a much-debated question. The original stock is unknown, but various species of wolf and jackal have been suggested as ancestors. Probably several wild types were domesticated by prehistoric man, and there has been a good deal of crossing between these different stocks. It is generally agreed that no trace of the dog is to be found in a primitive state, the dhole of India and dingo of Australia being believed to be wild descendants from domesticated ancestors. Several attempts have been made to classify the varieties of dogs systematically, but in many cases it is difficult to determine what are to be regarded as types, and what as merely mongrels and cross-breeds. It is, however, convenient to divide them into six groups for descriptive purposes. These groups are Wolfdogs, Greyhounds, Spaniels, Hounds, Mastiffs, and Terriers. (1) *Wolf-dogs*.—The Eskimo dog has oblique eyes, an elongated muzzle, and a bushy tail, which give it a wolfish appearance. Teams of these dogs are used by the Eskimos to draw sledges. They are sometimes crossed with wolves to maintain their strength. The Pomeranian dog was originally closely connected with this breed, but has been much modified. A smaller variety is known as the Spitz. Sheep-dogs and collies belong to the same group. Their hunting powers have been gradually converted into a wonderful ability to herd sheep and cattle. These dogs are frequently kept as pets, and are extremely wise and affec-

tionate. (2) *Greyhounds*.—These dogs are distinguished by a greater length of muzzle than that possessed by any other dog; very low forehead, short lips, thin and long legs, small muscles, contracted belly, and semi-pendent ears. The name appears to have no reference to the colour, but is derived from the Icelandic *grey*, a dog. The greyhound is the swiftest of dogs, and is chiefly used for coursing (q.v.). The Italian greyhound is a small, gentle animal kept purely as a pet. The Scotch deerhound and the extinct Irish wolfhound both belong to this group. The whippet is a cross between the greyhound and the terrier, and is used for rabbit-coursing and racing. The lurcher is a cross between the collie and the greyhound, and is often used by poachers. (3) *Spaniels*.—The chief breeds of spaniel are the Clumber, the Sussex, the Norfolk, and the Cocker. The English water-spaniel is almost extinct, but the Irish breed is well known. The poodle is probably derived from the spaniel. The Blenheim, the King Charles, the Ruby, and the Japanese are all toy spaniels. Setters are so named from their habit of crouching or 'setting' on scenting game. The distinct races are the English, the Gordon, black-and-tan in colour, with some features of the collie and the bloodhound, and the Irish setter, which is of a rich chestnut colour. Retrievers are used for retrieving game on land. The larger and more familiar breed is formed by crossing the Newfoundland and setter, the smaller breed by crossing the water-spaniel and terrier. The Newfoundland is simply a gigantic spaniel. The black-and-white variety known as the Landseer is probably a cross from the original breed, which was entirely black. The Newfoundland is a fine swimmer, and displays great courage and fidelity. The St. Bernard was so named because dogs of this breed assisted the monks of the hospice on the Great St. Bernard pass in rescuing travellers from the snow. The true St. Bernard is now extinct, but there are still descendants of the last one crossed with a Swiss shepherd's dog. (4) *Hounds*.—The bloodhound is probably the ancestor of all the English races of hounds. He is remarkable for the acuteness of his smell, and is used not only by sportsmen but by the police. The foxhound is smaller than the now extinct staghound, and is supposed to be a mixed breed between the

staghound or the bloodhound and the greyhound. The harrier is a smaller breed of foxhound, which, as its name implies, is employed to hunt the hare. The otterhound is a variety of harrier. The beagle is smaller than the harrier, and is used to hunt rabbits and hares, being often kept in packs. The basset-hound is a smooth-haired crooked-legged dog used sometimes for hunting hares. The dachshund or badger-dog is a short-legged dog, originally employed in badger-baiting. The pointer derives its name from its habit of stopping and pointing with the head in the direction of game, an hereditary faculty. A cross with the foxhound is now generally used. The Dalmatian or coach-dog is a spotted variety of pointer. (5) *Mastiffs*.—The English mastiff is an imposing-looking but not a very intelligent dog. Another variety is found in Tibet. The bull-dog belies its ferocious appearance by being gentle and affectionate. These dogs were originally employed in bull-baiting. The bull-terrier is a cross between the bull-dog and the smooth terrier. The German boarhound and the Great Dane also belong to the mastiff group, as does the pug, a dwarf variety. (6) *Terriers*.—The dogs of this group are noted for their gameness and intelligence. The Airedale, on account of his strength and courage, is largely used by police to accompany them in patrol work. The Kerry Blue resembles the Airedale in size and weight. The Irish terrier is a rough-coated dog, very intelligent and affectionate. There are two types of fox-terriers, the smooth and the rough or wire-haired; both kinds are strong, active, and wise, the rough variety perhaps surpassing the smooth. The Scotch terrier and the white West Highland terrier are lively and intelligent dogs. The small-sized Cairn terrier is excessively game. The Sealyham resembles a wire-haired fox-terrier, but has shorter legs and a longer body. The Bedlington is a medium-sized dog built on racing lines. The Welsh terrier is a miniature Airedale. The Dandie Dinmont is a peculiar breed of the Scotch terrier. It is usually either of a light-brown or a bluish-grey colour, termed respectively the 'Mustard' and the 'Pepper' variety. The Skye terrier has a longish body and long silky coat. The Yorkshire is the smallest of all terriers, and is a toy dog. The second

smallest terrier is the Border terrier, a game and sagacious dog. The Black-and-Tan terrier is also a favourite breed. The Kennel Club, which was founded in 1873 by Mr. S. E. Shirley, practically controls all matters connected with dog-breeding in the United Kingdom. It recognizes 62 breeds of domestic dog, though naturalists have distinguished as many as 185 varieties. The owner of a dog which has done any injury to cattle or sheep is liable in damages for the amount of injury done, whether the dog was previously known to be vicious or not. In other cases of injury being done by a dog, negligence must be proved against the owner before he is held liable for damages; he will not, in fact, be held so liable unless it can be shown that the dog had previously exhibited a propensity to violence, and that the owner was acquainted with this propensity. The Cruelty to Animals Act of 1854 prohibits the use of dogs for purposes of draught in any part of the United Kingdom. It is necessary for anyone keeping a dog which is more than six months old to pay an annual duty of 7s. 6d. for license to do so.—BIBLIOGRAPHY: W. Youatt, *Training and Management of the Dog*; R. B. Lee, *A History and Description of Modern Dogs*; F. T. Barton, *Our Dogs and All about Them*; J. S. Turner and V. Nicolas, *The Kennel Encyclopedia*.

Dog's-mercury, *Mercurialis perennis*, nat. ord. Euphorbiaceæ, a woodland herb common in Britain. It has poisonous properties, and may be made to yield a fugitive blue dye.

Dog's-tail Grass (*Cynosurus*), a genus of grasses. *Cynosurus cristatus* is a common British perennial with long, wiry roots going far underground, and has hairy leaves. It grows to a height of between 1 and 2 feet. See *Grasses* (Plate).

Dog-tooth Spar, a form of mineral calcium carbonate or calc-spar found in Derbyshire and other parts of England, and named from a supposed resemblance of its pointed crystals to a dog's tooth.

Dogwood, a common name of trees of the genus *Cornus*, but specifically applied in Britain to *C. sanguinea*, a common shrub with small cream-white flowers growing in round clusters.

Dol, a town of France, department of Ille-et-Vilaine, with an old cathedral. It

is famous for its market gardens. Tanning is carried on. Pop. 3540.

Dolci, Carlo (1616-1686), Italian painter of the Florentine school. Among his chief productions are: *St. Cecilia at the Organ* and *Herodias with the Head of John the Baptist*, both in the Dresden Gallery; *Ecce Homo* and *St. Andrew in Prayer*, at the Pitti Gallery; and *Magdalene*, at Munich.

Dôle, a town in France, Jura. The manufactures are Prussian blue, hosiery, ironware, and leather. Pop. 16,294.

Dolerite, compact rock of the Basaltic series, but crystalline throughout, composed of augite and labradorite with some titaniferous iron ore and often olivine. It makes, when unaltered, an excellent road-metal.

Dolgelly, a town of Wales, capital of Merionethshire, near the foot of Cader Idris. It has manufactures of woollens, flannels, and cloths. Pop. (1931), 2261.

Dolichos, a genus of leguminous plants, sub-order Papilionaceæ, found in almost all tropical and temperate countries. *D. Lablab* is one of the most common kidney beans in India, and *D. biflorus* (horse-gram) is used as cattle-food in the same country.

Dollar, a burgh, Scotland, Clackmannanshire, noted for its academy founded by John Macnab. Pop. (1931), 1485.

Dollart, The, a gulf of the North Sea, at the mouth of the Ems, between the Dutch province of Groningen and Hanover.

Döllinger, Johann Joseph Ignaz (1799-1890), German theologian. At the Œcumenical Council of 1869-1870 Dr. Döllinger became famous over Europe by his opposition to the doctrine of Papal infallibility. In consequence of his opposition to the Vatican decrees, he was excommunicated in 1871 by the Archbishop of Munich, and became leader of the Old Catholic party. Among his numerous works are: *Origins of Christianity*, *A Sketch of Luther*, *The Papacy*, *Lectures on the Reunion of the Churches*, and *Papal Legends of the Middle Ages*.

Dollond, John (1706-1761), English optician. He devoted his attention to the improvement of refracting telescopes, and succeeded in constructing object-glasses in which the refrangibility of the rays of light was corrected.

Dolls, representing more or less realistically the human form, have, for more than fifty centuries, been the common play-

things of children, more especially of girls, whose maternal instinct impels them to lavish upon these often crude surrogates all the affection and devotion which their elders display towards real babies. But in ancient times, and even in the ritual of many modern religions, worship is not infrequently paid to human images, which in ancient times, and among the less cultured modern peoples, are hardly distinguishable from dolls, such as children regard as playthings and their fancy endows with a crude animism. It is probable that the modern doll is in part at least the survivor of these primitive images of the deities of early peoples. The fact that modern dolls are usually of the female sex may also be due to the fact of the earliest prototype of the doll being an amulet representing the Great Mother.

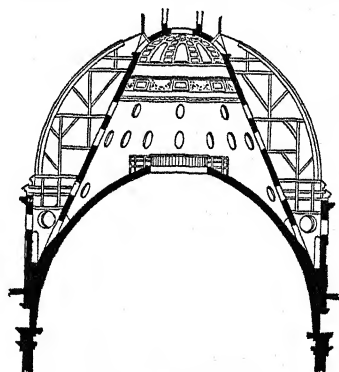
Dolomite, a mineral, the main constituent of magnesium limestone. It is composed of carbonate of calcium and magnesium in equal molecular quantities, and varies from grey or yellowish-white to yellowish-brown. Dolomite is easily scratched with the knife, and is semi-transparent.

Dolomites, a group of European mountains, a division of the Alps, in the Trentino, North Italy, named from the prevalence of the mineral dolomite. The highest summits are Palle di San Martino (10,969 feet), Sorapiss (10,798 feet), and Monte Tofana (10,715 feet).

Dolphin (*Delphinus*), a cetaceous animal, forming the type of a family (*Delphinidæ*) which includes also the beluga or white whale (*Delphinapterus*

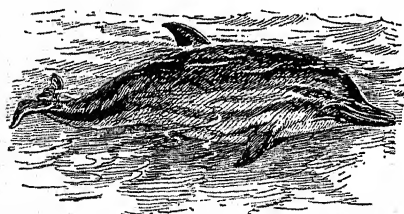
with extraordinary velocity. The common dolphin (*D. delphis*) measures from 6 to 10 feet in length, has a long, sharp snout with numerous nearly conical teeth in both jaws; its flesh is coarse, rank, and disagreeable, but is used by the Laplanders as food. It lives on fish, molluscs, &c. The animal has to come to the surface at short intervals to breathe. The structure of the ear renders the sense of hearing very acute, and the animal is observed to be attracted by regular or harmonious sounds. A single young one is produced by the female.

Dome, a vaulted roof of spherical or other curvature, covering a building or part of it, and forming a common feature in Byzantine and also in Renaissance



Dome of St. Paul's

Section showing the inner and outer domes with the conical wall. Diameter inside dome at base, 102 ft.



Common Dolphin (*Delphinus delphis*)

leucas), the narwhal (*Monodon*), porpoises (*Phocæna*), the ca'ing whale (*Globicephalus melas*), and the killer whale or grampus (*Orca gladiator*). Dolphins inhabit every sea; they are gregarious, and swim

architecture. Of domes the finest, without any comparison, ancient or modern, is that of the Rotunda or Pantheon at Rome. Among others the most noteworthy are St. Sophia at Constantinople, the cathedral of Santa Maria del Fiore at Florence, St. Peter's at Rome, St. Paul's, London, the Hôtel des Invalides and the Panthéon at Paris.

Domenichino (or **Domenico**) **Zampieri** (1581–1641), Italian painter. Among his best works are the *Communion of St. Jerome* in the Vatican Museum, the *History of Apollo*, the *Martyrdom of St. Agnes*, and the *Triumph of David*.

Domesday (or **Doomsday**) **Book**, a

book containing a survey of all the lands in England, compiled in the reign and by the order of William the Conqueror. The extent, tenure, value, and proprietorship of the land in each district, the state of culture, and in some cases the number of tenants, villeins, serfs, &c., were the matters chiefly recorded. The survey was completed within a year. Northumberland, Durham, Cumberland, and Westmorland were not included.—BIBLIOGRAPHY: H. Ellis, *General Introduction to Domesday Book*; W. de G. Birch, *Domesday: a Popular Account*.

Domicile, in law, the place where a person has a home or established residence. Domicile is often an important question in determining the efficacy of legal citations, the validity of marriage, the right of succession to property, &c. A permanent domicile may be constituted by birth, by choice, or by operation of the law. It is a legal principle that the wife takes the domicile of her husband.

Dominic, Saint (1170–1221), the founder of the order of the Dominicans. In 1215 he went to Rome to obtain the sanction of Pope Innocent III to erect a mission into a new order of preaching friars. His request was only partially granted, and it was the succeeding Pope, Honorius III, who first recognized the importance of a preaching order, and conferred full privileges on the Dominicans.

Dominica, a British West India island, belonging to the Leeward group, between Martinique on the south and Guadeloupe on the north. It is about 29 miles in length and 12 miles in breadth; area, 305 sq. miles, about one-third being under cultivation. It is rugged and mountainous, but it contains many fertile valleys and is well watered. There are several good anchorages and bays on the west coast. The principal exports consist of sugar, molasses, cocoa, and lime-juice. The annual value of exports is about £164,000, and of imports about £158,000. Roseau is the capital. Pop. 37,059, including about 420 aboriginal Caribs.

Dominical Letter, in chronology, properly called Sunday letter, one of the seven letters of the alphabet, A B C D E F G, used in almanacs, ephemerides, &c., to mark the first seven days of the year and all consecutive sets of seven days to the end of the year, so that the letter for Sunday will always be the same. The

same series is not repeated till after four times seven or twenty-eight years.

Dominican Republic. See *Santo Domingo*.

Dominicans, called also *predicants*, or *preaching friars* (*predicatores*), derived their name from their founder, St. Dominic. Their distinctive dress consists of a white habit and scapular with a large black mantle, and hence they have been commonly known as *Black Friars*. As fierce opponents and strenuous combatants against any departure from the teaching of the Catholic Church, the Dominicans were entrusted with the conduct of the Inquisition. With the Franciscans, their great rivals, they divided the honour of ruling in Church and State till the sixteenth century, when the Jesuits gradually superseded them in the schools and courts. They obtained new importance in 1620 by being appointed to the censorship of books for the Church.

Dominoes, a game played with small flat rectangular pieces of ivory, about twice as long as they are broad. They are marked with spots varying in number. When one player leads by laying down a domino, the next must follow by placing alongside of it another which has the same number of spots on one of its sides. The player who cannot follow suit loses his turn, and the object of the game is to get rid of all the dominoes in hand, or to hold fewer spots than your opponent, when the game is exhausted by neither being able to play. The game was introduced into Europe about the middle of the eighteenth century.

Domitian, or in full, Titus Flavius Domitianus Augustus (A.D. 51–96), Roman emperor, son of Vespasian, and younger brother of Titus, succeeded to the throne in 81. At first he ruled with a show of moderation and justice, but soon returned to the cruelty and excesses for which his youth had been notorious. He executed great numbers of the chief citizens, and assumed the titles of Lord and God. At length a conspiracy was formed against him, and he was assassinated.

Don, a river of Russia, which issues from Lake Ivan-Ozero, in the government of Tula, and falls into the Sea of Azov; whole course nearly 900 miles. The chief tributaries are: right bank, the Donetz and Voronezh; left, the Khoper and Manych. Although not admitting vessels

of much draught, the Don carries a large traffic. It is connected by canal and rail with the Volga and has productive fisheries. The principal port is Rostov.

Don, a river, Scotland, Aberdeenshire, rising near the Banffshire border. It falls into the North Sea a little to the north of Aberdeen, after a total course of 82 miles. Its salmon fisheries are of considerable value.—Also, a river of Yorkshire, which joins the Ouse after a course of about 70 miles. It is navigable for small craft as far as Sheffield.

Donaghadee, a seaport, Northern Ireland, County Down, on the Irish Channel. It has accommodation for vessels drawing 12 feet. Pop. (1926) 2535.

Donaldson, Sir James (1831–1915), Scottish scholar. In 1886 he became principal of the United College of St. Salvator and St. Leonard in St. Andrews University, and in 1890 principal of the university. His works include: *Modern Greek Grammar*; *Lyra Græca: Specimens of Greek Lyric Poets*; *History of Christian Literature and Doctrine from the Death of the Apostles to the Nicene Council*; and *Woman: her Position and Influence in Ancient Greece and Rome, and among the Early Christians*.

Donaldson, John William (1811–1861), English philologist. His first work was *The Theatre of the Greeks*. His other works include *The New Cratylus* and *Varronianus*, which deal with Greek and with Latin philology respectively.

Donatello (1386–1466), one of the revivers of the art of sculpture in Italy. Statues of St. John, St. George, Judith, David, John the Evangelist, and St. Cecilia are amongst his leading works.

Donati's Comet. See *Comet*.

Donatists, a body of African schismatics of the fourth century, so named from their founder Donatus, who taught that though Christ was of the same substance with the Father yet that he was less than the Father.

Donatus, Ælius (b. A.D. 333), Roman grammarian. He wrote a grammar of the Latin language so universally used in the Middle Ages that 'Donat' became a common term for grammar or primer of instruction.

Don Benito, a town, Spain, province of Badajoz. It has manufactures of woollens, and a trade in cattle, grain, and melons. Pop. 21,000.

Doncaster, a market town, England, West Riding of Yorkshire, on the River Don. It has railway workshops, and manufactures of ropes, canvas, and machinery. It has been long celebrated for its annual races, begun in 1615, and held in September. Pop. (1931), 63,308.

Dondrah Head, the southern extremity of the Island of Ceylon.

Donegal (now *Tírconaille*), a county, Irish Free State, washed north and west by the Atlantic; area, 1,193,641 acres. The coast is much indented, and there are several islands. Lough Swilly is the largest inlet. Donegal is the most mountainous county in Ireland (Errigal, 2460 feet). Stock-breeding and fishing are important, but agriculture (chief crops, oats, potatoes, and flax) is in a very backward state. Linen cloth, woollen stockings, and muslin are manufactured. The chief towns are Lifford (the county town) and Donegal, which has a fairly good harl our. There are several light railways. Fish and dairy produce are the chief exports. Pop. (1926) 152,511.

Donetz, a Russian river which rises in the government of Kursk and joins the Don; length, 400 miles. Its basin is rich in coal. See *Ukraine*.

Donetz, a province, Russia, Republic of Ukraine.

Dongola, a province of the Anglo-Egyptian Sudan, extending on both sides of the Nile from about lat. 18° to lat. 20° N. Its chief products are dates, cotton, indigo, and maize. The population is a mixture of Arabs and indigenous Nubians. Its chief town is New Dongola, on the Nile. Pop. 20,000.

Donizetti, Gaetano (1797–1848), Italian composer. In 1830 appeared his *Anna Bolena*, which first, along with *Lucrezia Borgia* and *Lucia di Lammermoor*—the latter his masterpiece—acquired for him a European fame. *La Favorita* and *La Fille du Régiment* are amongst his most popular productions. He wrote in all as many as seventy operas.

Don Juan, the hero of a Spanish legend. He killed in a duel the father of a girl whom he had attempted to seduce, and afterwards invited the statue of the slain man to a revel. The invitation was accepted, and the statue conducted Don Juan to hell. The legend has furnished the subject for many dramas and operas. The most famous of the latter is Mozart's

Don Giovanni. Amongst the former are *Don Juan, ou Le Festin de Pierre* by Molière (1665), and *The Libertine* by Shadwell. The *Don Juan* of Byron bears no relation to the old story but in name and in the libertine character of the hero.

Donnay, Maurice Charles (1859–), French dramatist. His works include: *Le Torrent*, *L'Autre Danger*, and *Le Ménage de Molière*.

Donne, John (1573–1631), English poet and Dean of St. Paul's. His name is pronounced as if it were spelt 'Dunn'. In 1610 he wrote for the king the *Pseudo-Martyr*, and in 1612 he published a philosophical poem, *The Progress of the Soul*. By the desire of King James, Donne took orders, and, settling in London, was made preacher of Lincoln's Inn. In 1621 he was appointed Dean of St. Paul's. As a poet, Donne stands extremely high, and may be deemed the founder of what Dr. Johnson calls the *metaphysical* class of poets. A collection of his poems appeared in 1633, and they include: *The Storm*, *The Calm*, *The Blossom*, and *Upon Parting with his Mistress*. He also wrote *Letters*, *Sermons*, *Essays on Divinity*, and other pieces.—Cf. H. J. C. Grierson, *The Poems of John Donne*.

Donnybrook, formerly a village, Ireland, now a suburb of Dublin. Its famous fair, instituted under King John in 1204, and which seldom passed off without riot and bloodshed, was abolished in 1855.

Doon, a river in Ayrshire, Scotland, which issues from the long, narrow Loch Doon and falls into the Firth of Clyde; length, 27 miles.

Doppler's Principle, the principle by which the motions of heavenly bodies in the line of sight can be determined spectroscopically. When the distance between a body and the observer is being diminished, the number of waves of light of any definite colour received from it per second is increased, just as a swimmer meets more waves in the same time if he swims to meet them. Each colour of light is therefore slightly shifted towards the violet end of the spectrum. By investigation of such displacements, the motions of stars, nebulae, &c., in the line of sight can be measured.

Dor, or **Dorr**, the real black-beetle, *Geotrūpes stercorarius*, one of the most common British beetles, of a stout form,

less than 1 inch long, black with metallic reflections.

Dora, the name of two rivers in Northern Italy, the Dora Baltea and the Dora Riparia, both tributaries of the Po.

Doran, John (1807–1878), English writer. His works include: *History of Court Fools*, *The Book of the Princes of Wales, Their Majesties' Servants* (a history of the English stage from Betterton to Kean), and *Memories of Our Great Towns*.

Dorchester, borough and chief town of Dorsetshire. There are large cavalry and infantry barracks near the town. The trade consists chiefly in agricultural produce. Pop. (1931), 10,030.

Dordogne, a department of France; area, 3550 sq. miles. The chief minerals are iron, slate, limestone, and marble. Mining, iron manufacture, &c., are carried on to a considerable extent, and there are a number of vineyards. Pop. (1926), 392,489.—The river *Dordogne*, principal river of the department, after a course of 290 miles, unites with the Garonne in forming the Gironde.

Dordrecht. See *Dort*.

Doré, Gustave Paul (1833–1883), French artist. He distinguished himself greatly as an illustrator of books. His illustrations of Rabelais, of Perrault's *Tales*, Sue's *Wandering Jew*, Dante's *Divina Commedia*, and Cervantes' *Don Quixote* displayed great fertility of invention. His illustrations of the Bible, of Ariosto's *Orlando Furioso*, and Milton's *Paradise Lost* are also of high excellence.

Dorema, a genus of plants, nat. ord. Umbelliferae. *D. ammoniacum*, a Persian species, yields the ammoniacum of commerce.

Dorians, one of the three great branches of the Greek nation who migrated from Thessaly southwards, settling for a time in the mountainous district of Doris in Northern Greece and finally in Peloponnesus. Their migration to the latter was said to have taken place in 1104 B.C.; and as among their leaders were certain men reputed to be descendants of Hercules (or Herakles), it was known as the return of the Heraclidæ.

Dorking, a town of England, county of Surrey, largely consisting of villa residences. Large numbers of fowls, known as *Dorkings*, of an excellent breed, are reared here and sent to the London markets. Pop. (1931), 10,109.

Dormant State, a state of torpidity in which certain animals pass a portion of the year. In cold and temperate climates this period of long sleep takes place during the winter months, and is properly called *hibernation*. Bats, bears, some animals of the rodent order, such as the porcupine, the dormouse, and the squirrel, all the animals belonging to the classes of Amphibia and Reptilia, such as tortoises, lizards and snakes, frogs, &c., also many species of molluscs and insects, hibernate more or less completely. During hibernation there is a great decrease of heat in the bodies of the animals, the temperature sometimes sinking to 40° or even 20° F., or in general to a point a little above that of the surrounding atmosphere. With frogs and other amphibia the dormant state is very common. The term *æstivation* has been used to describe a similar condition into which certain animals, such as serpents and crocodiles, in tropical countries pass during the hottest months of the year. Plants also present many interesting examples of the dormant state, by which unfavourable periods or conditions are tided over. A seed, for instance, contains a dormant embryo or plantlet, which resumes growth (i.e. germinates) when the temperature rises above a certain level, provided sufficient moisture and air are present. Many lower forms, notably bacteria, are able to form thick-walled cells (spores) that can retain their vitality for a considerable time.

Dormouse, the popular name of small rodent mammals constituting a special family (Gliridæ or Myoxidæ) allied to rats and mice. They inhabit temperate and warm countries, and subsist entirely on vegetable food. Whilst feeding they sit upright and carry the food to their mouths with their paws. Dormice pass the winter in a lethargic or torpid state. The common British dormouse (*Muscardinus avellanarius*) is a graceful little creature about 3 inches in length, with a tail 2½ inches long. It feeds on hazel-nuts, eggs, and insects, and constructs a spherical nest, and is not found in Scotland or Ireland.

Dornbirn, a manufacturing town in Tirol, about 6 miles from the Lake of Constance. It is engaged in iron-founding, weaving, and dyeing. Pop. 14,000.

Dornoch, a royal burgh and seaport of Scotland, Sutherland, on the Dornoch Firth. Pop. (1931), 725.—The *Firth* runs

inland for about 16 miles between Ross-shire and Sutherlandshire.

Dorohoi, a town of Romania, in North-West Moldavia, an important road and railway junction. Pop. 11,140. — The department of *Dorohoi* has an area of 1090 sq. miles, and a pop. of 189,789.

Dorpat (Estonian *Tartu*), a town formerly in Livonia, now belonging to the Republic of Estonia. It is situated on the Embach, and is chiefly remarkable for its university and other educational establishments. It has breweries and saw-mills, manufactures of cigars, and a good trade in grain, wool, and flax. There are large printing-works. Pop. 50,000.

Dorset, Thomas Sackville, Earl of (1536–1608), English statesman and poet. As a student of the Inner Temple he wrote, in conjunction with Thomas Norton, the tragedy of *Gorboduc*, or *Ferrex and Porrex* (first acted in 1561), the first example in English of regular tragedy in blank verse. His other works include: *The Mirror of Magistrates* and the *Complaint of Henry, Duke of Buckingham*.

Dorsetshire, a maritime county in the south of England; area, 625,612 acres, over 490,000 being under crop. The general surface of the county is undulating, its principal elevations being chalk hills known as the North and South Downs, upon which immense flocks of sheep are pastured. A great part of the county is in grass, and dairy husbandry is extensively carried on. Portland stone, pipe-clay, plastic clay, and potter's clay abound. The principal manufactures are those of flax, canvas, duck, &c., also silk and woollens. The fish frequenting the coast are of various kinds, but mackerel is the most abundant. Near the mouth of Poole harbour is a prolific oyster bank. The principal rivers are the Stour, the Frome, and the Piddle. Dorchester is the county town. Other towns are Bridport, Poole, and Weymouth. Pop. (1931), 239,347.

Dort (Dordrecht), a town, Holland, province of South Holland, on an island between the Maas and the Merwede. It carries on an extensive trade by sea, river, and canal, and has sawmills, engineering-works, and sugar-refineries. There is a depth of water of 20 to 22 feet at the town. Pop. 56,195.

Dort, Synod of, an assembly of Protestant divines convoked at Dort on 13th Nov., 1618, dissolved on 9th May, 1619.

It resulted in the condemnation of the Arminians and the dogmatic establishment of Calvinism in the Reformed Church.

Dortmund, a city of Prussia, province of Westphalia, on the Emscher, starting-point of an important canal to the lower Ems. It is the centre of important railway systems, and has extensive coal-mines in the vicinity, and active manufactures of iron, steel, machinery, and railway plant. There are also a number of breweries, potteries, tobacco-factories, and chemical-works. Pop. 295,026.

Dory, or **John Dory** (*Zeus faber*), a bony fish which is the type of a special family (*Zeidae*), and is celebrated for the delicacy of its flesh. It seldom exceeds 18 inches in length, and is yellowish-green in colour with a blackish spot on each side, which, according to an old superstition, is the mark of St. Peter's forefinger and thumb. The dory is found on the Atlantic shores of Europe and in the Mediterranean.

Dost Mohammed Khan (1793–1863), a successful usurper who obtained possession of the throne of Afghanistan after the flight of Mahmud Shah in 1818. He ultimately became a steady supporter of British power in the East.

Dostoevsky, Feodor Mikhailovitch (1821–1881), Russian novelist. His first novel, *Poor People*, came out in 1846. Among his works that have appeared in English are: *Crime and Punishment*, *Injury and Insult*, *The Friend of the Family*, *The Gambler*, *The Idiot*, *Prison Life in Siberia*, *Uncle's Dream*, *The Permanent Husband*, *The Brothers Karamzov*, and *Letters from the Underworld and Other Tales*. There is a complete edition of his novels by C. Garnett, 1912.—Cf. J. M. Murry, *F. Dostoevsky: a Critical Study*.

Dotterel (*Eudromias morinellus*), a species of plover which breeds in the north of Europe and returns to the south for the winter. It is found all over Europe and Northern Asia. The dotterel is about 8 inches long. Contrary to the general rule, the hen is larger and more brightly coloured than the cock, and the latter performs most of the duties of incubation.

Douai, a town, France, department of Nord, on the Scarpe. It has some fine buildings and educational institutes. There is a cannon-foundry, and the chief industries are connected with linen manufactures, machine-works, and tanneries.

There is an active trade in grain. Pop. 36,314.

Douarnenez, a seaport, France, Finistère. It depends chiefly on the sardine fishery. Pop. 13,753.

Double-stars, or **Binary Stars**, stars which are so close together that they appear as one to the naked eye, but are seen to be double when viewed through a telescope. One of these stars may revolve about the other, or, more accurately speaking, both revolve round the common centre of gravity.

Doubs, a department of France, having Switzerland on its eastern frontier; area, 2052 sq. miles. Its surface is traversed by four chains of the Jura. About a third of the land is arable, but much the greater part is covered with forests. Maize, potatoes, hemp, and flax are the principal crops. Gruyère cheese is extensively made. The minerals include iron, lead, and marble. Pop. (1926), 296,591.—The River Doubs rises in the department and flows till it joins the Saône; length, 250 miles.

Douglas, a family distinguished in the annals of Scotland. The most eminent members of the family are here noticed in chronological order. James, son of the William Douglas who had been a companion of Wallace, and is commonly known as the Good Sir James, early joined Bruce, and was one of his chief supporters throughout his career, and one of the most distinguished leaders at the battle of Bannockburn. He was called 'Black Douglas' from his swarthy complexion. He fell in battle with the Moors while on his way to the Holy Land with the heart of his master in 1331.—Archibald, son of Archibald the Grim and fourth earl, was the Douglas who was defeated and taken prisoner by Percy (Hotspur) at Homildon 14th Sept., 1402. He was also taken prisoner at Shrewsbury 23rd July, 1403, and did not recover his liberty till 1407. He was killed at the battle of Verneuil, in Normandy, in 1427.—William, sixth earl, born 1422, together with his only brother David, was assassinated by Crichton and Livingstone at a banquet to which he had been invited in the name of the king, in Edinburgh Castle, on 24th Nov., 1440.—William, the eighth earl, a descendant of the third earl, restored the power of the Douglasses by a marriage with his cousin, heiress of another branch of the family; was appointed Lord-Lieutenant of the

kingdom, and defeated the English at Sark. Having entered into treasonous league, he was invited by James II to Stirling and there murdered by the king's own hand, 22nd Feb., 1452.—The fifth Earl of Angus, Archibald Douglas, was the celebrated 'Bell-the-Cat', one of whose sons was Gavin Douglas the poet. He died in a monastery in 1514.—Archibald, the sixth earl, married Queen Margaret, widow of James IV, attained the dignity of regent of the kingdom, and after various vicissitudes of fortune, having at one time been attainted and forced to flee from the kingdom, died about 1560.—BIBLIOGRAPHY: David Hume of Godscroft, *A History of the House of Douglas and Angus*; Sir H. Maxwell, *A History of the House of Douglas*.

Douglas, Gawin (1474–1522), Scottish poet. He was the son of Archibald, fifth Earl of Angus. He translated Virgil's *Æneid* into verse with much spirit, prefixing original prologues to the different books of the original. This was the first poetical translation into English of any classical author. It was written about 1512, and first published in 1553. He also wrote *The Palace of Honour* and *King Hart*, both allegorical poems.

Douglas, Sir Howard (1776–1861), British soldier. He acquired much reputation by his writings on military subjects, especially his *Military Bridges* and *the Passage of Rivers* (1816) and *Treatise on Naval Gunnery* (1819).

Douglas, Stephen Arnold (1813–1861), American politician. He was especially prominent in connexion with the question as to the extension of slavery into new states and territories, which he maintained was a matter to be settled by the people of the respective states or territories, and not by Congress.

Douglas, capital of the Isle of Man, is situated on the s.e. coast, and is a favourite summer-resort. Pop. (1931), 19,329.

Doulton, Sir Henry (1820–1897), English potter. He established a school of artists in connexion with his manufactory, with the object of promoting originality in design.

Doumergue, Gaston (1863–), French politician. He was Colonial Minister from 1914 to 1917, and was President of the French Republic from 1924 to 1931.

Doum Palm, a palm tree, *Hyphaene thebaica*. The fruit is about the size of an

apple; it has a fibrous mealy rind, and is eaten by the poorer inhabitants of Upper Egypt, where it grows. Ropes are made of the fibres of the leaf-stalks.

Doune, a burgh in West Perthshire, Scotland, on the River Teith, once famous for its manufacture of Highland pistols and sporrans. The ruined castle is described in *Scott's Waverley*. Pop. (1931), 822.

Douro, one of the largest rivers of the Spanish Peninsula, entering the sea, after a course of 500 miles, 3 miles below Oporto. It is navigable for small vessels for about 70 miles.

Dove. See *Turtle-dove* and *Pigeon*.

Dover, a municipal borough of England, county of Kent, on the Straits of Dover, 21 miles from Calais. It is an important railway terminus, and port for mail and packet service with the Continent. Shipbuilding, sail-making, and fisheries are carried on. There is a commercial harbour (75 acres), a tidal harbour (14 acres), and an Admiralty harbour (610 acres), having accommodation for vessels of all sizes. There are besides graving-docks and passenger piers. The celebrated castle stands on a high chalk cliff. Dover is the chief of the Cinque Ports, and has extensive barracks. Pop. (1931), 41,095.

Dover, a city of the U.S.A., in New Hampshire. It is situated on both sides of the Cochecho, which has here a fall of over 30 feet, affording abundant water-power for the large iron and cotton manufactories. Pop. 13,029.

Dover, Straits of, the narrow channel between Dover and Calais which separates Great Britain from the French coast. At the narrowest part it is only 21 miles wide.

Dover's Powder, a preparation of opium (1 grain), ipecacuanha (1 grain), and potassium sulphate (8 grains), administered in average doses of 10 grains to adults only. It is used as a diaphoretic in incipient catarrh, as an anodyne in gastric pain, and in dysentery and diarrhoea.

Dovre-Fjeld, an assemblage of mountain masses in Norway, forming the central part of the Scandinavian system, and generally composed of gneiss and mica schist.

Dow, Gerard (1613–1675), Dutch painter. Among his pictures, generally of small size and mostly scenes of family life, are: *The Evening School*. *Young*

Mother, Woman Sick with Dropsy, and The Bible Reader.

Dowden, Edward (1843–1913), Irish critic and poet. He became professor of English literature at Trinity College, Dublin, in 1867. His critical writings include: *Shakspeare: his Mind and Art; Life of Shelley*, the chief authority on the poet's life, being founded on papers in the possession of the Shelley family; *Robert Browning*; and *Essays, Modern and Elizabethan*. A volume of poems by him appeared in 1876, and his collected *Poetical Works and Letters* appeared in 1914.

Dower, in English law, is the right which a wife (not being an alien) has in the freehold lands and tenements of which her husband dies possessed and undisposed of by will. By common law this right amounts to one-third of his estate during her life; by local custom it is frequently greater.

Dowlais, a town of South Wales, Glamorganshire, with important iron- and steel-works. It is now part of Merthyr Tydfil.

Down, a county of Northern Ireland, bounded on the north by Belfast Lough and on the east by the Irish Sea; area, 608,862 acres, of which over five-sixths are productive. Down is copiously watered by the Rivers Bann, Lagan, and Newry. The surface is very irregular, and in parts mountainous, Slieve Donard, in the Mourne Mountains, being 2796 feet high. Agriculture is in a flourishing condition, oats, wheat, flax, turnips, and potatoes being the principal crops. The native breed of sheep is well known. The principal manufactures are linen and muslin. The fisheries on the coast are considerable. The county town is Downpatrick; others are Newry, Newtownards, Bangor, and Banbridge. Pop. (1926) 209,179.

Downing Street, a street in London, leading from Whitehall, in which are the official residences of the Prime Minister (No. 10) and of the Chancellor of the Exchequer (No. 11), and the Foreign and Colonial Offices.

Downpatrick, a market town of Northern Ireland, county town of Down, 21 miles south-east of Belfast. Pop. (1926) 3147.

Downs, The, a celebrated roadstead for ships, extending 6 miles along the east coast of Kent in England, protected on the seaward side by the Goodwin Sands.

Doyle, Sir Arthur Conan (1859–1930),

English novelist, a nephew of Richard Doyle, studied medicine, and for some years practised, but gave up the profession for that of literature. In 1887 he produced *A Study in Scarlet*, in which he created the detective Sherlock Holmes. Among his other books are: *Micah Clarke, The Sign of Four, The White Company, The Adventures of Sherlock Holmes, Brigadier Gerard, The Great Boer War, The Crime of the Congo, The Lost World, The Poison Belt, The British Campaign in France and Flanders, The New Revelation, and The Vital Message.*

Doyle, Sir Francis Hastings Charles (1810–1888), English poet. In 1867 he was elected professor of poetry at Oxford in succession to Matthew Arnold. He published *Miscellaneous Verses* (1840); *The Two Destinies* (1844); *The Return of the Guards and other Poems* (1866); and subsequently printed his *Oxford Lectures* (1869 and 1877) and *Reminiscences and Opinions, 1813–1885* (1886).

Doyle, Richard (1824–1883), English artist. He was long well known as a constant contributor of satirical designs to *Punch*, and also showed much talent in illustrations to Leigh Hunt's *Jar of Honey*, Thackeray's *Newcomes* and his *Rebecca and Rowena*, and Ruskin's *King of the Golden River*.

Dra'a, a river, or rather watercourse, of Morocco, rising in the Atlas Mountains, penetrating the Anti-Atlas range, and forming the shallow lagoon El Debaia. From this point until it enters the ocean it forms the southern boundary of Morocco.

Dracæna, a genus of endogenous evergreen plants, nat. ord. Liliaceæ. It includes the dragon tree of Teneriffe (*D. Draco*), celebrated for producing the resin called dragon's blood.

Drachenfels, a hill in Rhenish Prussia, about 8 miles south-east of Bonn, rising 900 feet above the Rhine, and crowned by the old castle of Drachenfels.

Draco, a legislator of Athens, about 620 B.C., whose name has become proverbial as an inexorable and bloodthirsty lawgiver, and whose laws were said to have been written in blood, not ink.

Dragon, a fabulous monster, the stories regarding which reach back almost as far as history. It was supposed to be a winged and two-legged serpent; its body was covered with scales, its head was crested, and its mouth spouted fire. The immediate

source of the mediæval conception is probably the Bible, modified by accounts brought home by the Crusaders of the crocodiles in Egypt.

Dragon, or **Dragon-lizard**, a name for several species of lizards inhabiting South-East Asia. The common flying lizard (*Draco volans*), the best type of the genus, is about 10 or 12 inches in length, the tail being extremely long in proportion to the body. Its food consists almost exclusively of insects.

Dragonet, the common name of small marine fishes constituting a special family (Callionymidæ). The gemmeous dragonet (*Callionymus lyra*) is found in the British seas.

Dragon-fly, the common name of members of a family (Odonata or Libellulidæ) of neuropterous insects. They are beautiful in form and colour, and are of very powerful flight. The great dragon-fly (*Æschna grandis*) is about 4 inches long, and the largest of the British species. They live on insects, and are remarkably greedy. The dragon-fly deposits its eggs in the water, where the wingless nymphs live on aquatic insects. The nymph stage lasts for a year.

Dragonnades, or **Dragonades**, the name given to the persecutions directed against the Protestants, chiefly in the south of France, during the reign of Louis XIV, shortly before the revocation of the Edict of Nantes in 1685.

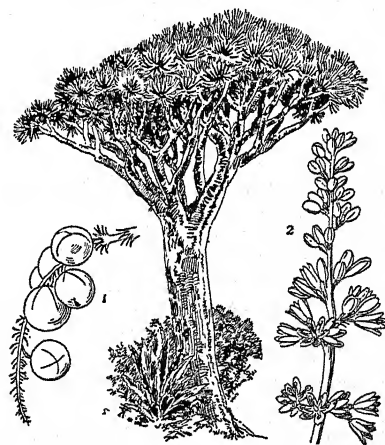
Dragon's Blood, or **Gum Dragon**, a resinous juice, usually obtained by incision from various tropical plants, as *Calamus Draco*, *Dracæna Draco*, *Pterocarpus Draco*, &c. It is opaque, of a reddish-brown colour, brittle, and has a smooth, shining, conchoidal fracture, and is used for colouring varnishes, for staining marble, leather, and wood, and for tooth tinctures.

Dragon Tree (*Dracæna Draco*), a tree-like liliaceous plant, a native of the Canaries, yielding the resin known as dragon's blood.

Draguignan, a town of Southern France, since 1793 capital of the department of Var. It has manufactures of silk, soap, and leather. Pop. 9974.

Draining, in agriculture, a method of improving the soil by withdrawing the superfluous water from it by means of channels that are generally covered over. The rudest form of open drains are the deep furrows lying between high-backed

ridges, and meant to carry off the surplus water after the soil is completely saturated. The ordinary ditch is a common form of watercourse useful in certain cases, as in hill pastures. But covered drains at a depth of 4 feet or so are the common forms in draining agricultural lands. They are generally either *stone-drains* or *tile-drains*. Stone-drains are either formed on the plan of open culverts of various forms, or of small stones in sufficient quantity to permit a free and speedy filtration of the water through them. Tile-drains possess all the qualities which are required in the formation of drains, affording a free ingress to water, while they effectually exclude earth, as well as other injurious substances, and vermin. Drainage tiles should always rest on soles, or flats of burned clay. Pipe tiles, which combine the sole and cover in one piece, have been made of various shapes, but the best form appears to be the cylinder. In the drainage of buildings, glazed socketed stoneware pipes are used, varying in diameter from 3 to 9 inches, laid straight



Dragon Tree (*Dracæna Draco*)

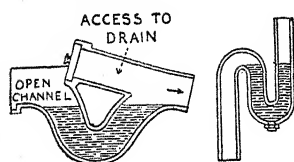
1, Fruiting branches. 2, Flowers.

in plan and in longitudinal section, and laid to falls calculated to give a minimum velocity of 3 feet per second when flowing half full. These are laid in trenches, with inspection chambers at all changes in direction, and should be laid

on and surrounded with concrete. In bad ground, or under dwelling houses, cast-iron pipes are employed, with special turned and bored joints. In towns these drains lead into the public sewers.—

BIBLIOGRAPHY: G. S. Mitchell, *Handbook of Land Drainage*; Moore and Silcock, *Sanitary Engineering*; Gilbert Thomson, *Modern Sanitary Engineering*.

Drain-trap, a contrivance to prevent the escape of foul air from drains, while allowing the passage of water into them. In the traps represented below there must



Drain-traps

always be a water-seal to bar the way against the escape of the gas from the drain or sewer.

Drake, Sir Francis (1545–1595), English navigator. Having gathered a number of adventurers round him, he made two successful cruises to the West Indies in 1570 and 1571. Next year, with two small ships, he again sailed for the Spanish Main, captured the cities of Nombre de Dios and Vera Cruz, and took a rich booty. In 1577 Drake made another expedition to the Spanish Main, having this time command of five ships. On this the most famous of his voyages Drake passed the Straits of Magellan, plundered all along the coasts of Chile and Peru, sacked several ports, and captured a galleon laden with silver, gold, and jewels to the value of perhaps £200,000. He finally arrived at Plymouth 3rd Nov., 1580, being the first of the English circum-navigators. Five years afterwards Drake was again attacking the Spaniards in the Cape Verde Islands and in the West Indies, and in 1588 particularly distinguished himself as vice-admiral in the conflict with the Spanish Armada. His later expeditions, that in 1595 against the Spanish West Indies and that to Panama, were not so successful.—Cf. Sir J. S. Corbett, *Sir Francis Drake*.

Drakenberg Mountains, a range of

South Africa forming the western frontier of Natal.

Drama, a form of art which imitates action by introducing real persons to represent the fictitious characters, and to carry on the story by means of action and dialogue.

Man is naturally an imitative animal, and some crude form of drama must have been in existence in very early times. We can see the origins of drama in many of the games played by children, where important events such as war, marriage, and sacrifice are represented in song and dance. In Greece, the cradle of drama as of everything that is good, there must have been in prehistoric times war-dances which formed the basis of tragedy, and rough vintage revel dances which formed the basis of comedy.

Greek Drama.—The Greek drama was religious in its origin. It arose from the dithyrambs or songs composed in honour of Dionysus, the god of all vegetation, though identified most closely with the vine. When vegetation died in winter, this was considered to be the death of Dionysus; when it bloomed anew in the spring, this was thought to be the god's resurrection. The one event was celebrated with gloomy song and dance, and the other with merry revels and crude indecency. The history of Greek drama is the history of the decline and fall of the chorus. At first the chorus was the whole play, and in the *Supplices* of Æschylus, the earliest extant tragedy, the chorus played a predominating part. According to tradition, Thespis (about 535 B.C.) introduced for the first time a masked actor, who carried on a dialogue with the leader of the chorus. Æschylus introduced a second actor, and Sophocles a third. It is thought that there never were more than three actors, but, of course, duplication of parts was permitted. There were also frequently mute characters (*kōpha prosōpa*) on the stage. Dialogue became more important in the later plays of Æschylus, and chorus became less important; Sophocles developed his dialogue in masterly style, though his choruses are among the most beautiful things in all Greek poetry; in Euripides the choruses, however lovely in themselves, are less an integral part of the drama than they were in the plays of his predecessors. In fact the chorus acted as

a clog on the freedom of the dramatist, who wished to develop exciting situations and depict realistic characters. In comedy the same decline of the chorus is to be found; in the *Acharnians*, the earliest comedy, the chorus is very prominent; in the *Phutus*, the last comedy extant, it is comparatively unimportant. Sumptuary laws had something to do with this, and there is a vast difference between the magnificently appavelled chorus in the *Birds*, and the chorus in the *Lysistrata*, which represented elderly Athenian men and women in their everyday costume.

Greek tragedies were usually presented in the form of trilogies, that is, in sets of three plays all dealing with the same subject. To these was added, as a rule, a fourth play, known as a satyr-play, intended to lighten the gloom of the three preceding tragedies. We have one complete trilogy preserved—the magnificent *Oresteia* of Æschylus, consisting of the *Agamemnon*, *Choephore*, and *Eumenides*. In later times the three plays of the trilogy dealt with different subjects. The tragedies to be performed were carefully selected by some of the Athenian magistrates, and at the festival prizes were given for the best tragedy, on the recommendation of a carefully chosen jury. Comedies were presented one at a time; prizes were offered for the best of them also.

Each of the three Greek tragic writers whose work has been preserved is supreme in his own way. Æschylus's lyric dramas are among the greatest writings of all time; the plays of Sophocles are masterpieces of deft construction, of well-woven plot, and ironic dialogue; and his choruses are lyrics of the greatest beauty. Euripides, the latest of the three, is a great poet and a champion of the weak, such as women and slaves; moreover, he sees deeply into men's hearts. Of Greek comic poets we only possess one, but he is a host in himself. Aristophanes plays with a master's hand upon every note in the whole comic gamut. His works were very frequently political and highly personal in their tone. The old comedy, however, was essentially the product of its own age; it did not invite, or even permit, imitation. The new comedy, of which Philemon, Menander, and Diphilus were the principal writers, gradually supplanted it. Their plays were more or less romantic comedies

with carefully constructed plots. They are all lost, but we may gain some idea of them from Plautus and Terence, and from the fragments which have been found, some of them fairly recently.

Roman Drama.—Roman drama is not intrinsically good; it is in many respects a weak imitation of Greek drama, but it has been very much more important in its influence. Early English, French, and Italian dramatists all turned to Seneca as a model for tragedy, and to Plautus and Terence as models for comedy. Plautus is decidedly coarse at times, but his work is wholesome and vigorous, and he is a more creative and virile writer than Terence. Terence's plays are somewhat weak dramatically, but are written in a style of great beauty. Seneca, the only Roman tragic writer, had an immense influence on later dramatists. It is hard to account for this. Senecan tragedy abounded in bloodshed and horrors; the speeches are full of pompous rant, and their metre is most monotonous. As the Roman Empire declined so did the Roman stage; finally nothing was performed save pantomime, in the proper sense of the word, where everything was done in dumb-show.

Medieval Drama.—There is no drama between the death of Seneca and the Renaissance, unless we except the six curious 'comedies' of the nun Hrosvitha of Gandersheim (born about A.D. 935). They must be regarded as an isolated phenomenon. The Church for long discouraged drama, but ended by adapting it to its own purposes. As in Greece, therefore, drama originated in England from religion. The priests impressed certain events in sacred history upon the minds of their congregation by means of dramatic performances which at first took place actually in the church. It is easy to understand how performances of this sort arose from the singing of suitable anthems on festival days, just as oratorio tends to become opera. The Oberammergau passion-play is a somewhat sophisticated representative of these liturgical plays; it cannot be called a survival, as it only dates back to 1633. These mystery-plays, so called because they were produced by the trade-guilds (Lat. *ministerium*, a trade), were eventually brought out into the market-place on wagons, and were moved round to various

'stations' in the town, different plays being performed at each station. Several collections of these plays survive—the Wakefield, Chester, and Coventry plays. They are written in a lively fashion, and are often naively humorous. The next development of the drama was the morality play or allegory; the well-known *Everyman* is the most finished specimen of this kind of play which we possess. Here personifications of Virtues and Vices formed the dramatis personæ. The interlude is another early species of drama; it marks a still further advance. John Heywood (1497–1580) is the most important writer of interludes, the controversial plays of John Bale (1495–1563) serving to link the interlude to the regular drama, which began gradually to spring up.

Elizabethan Drama.—The first English comedy, *Ralph Roister Doister*, appeared in 1551. It is by Nicolas Udall, and is based upon the *Miles Gloriosus* of Plautus. *Gammer Gurton's Needle*, a more native production, thought to have been by John Still, who was master of St. John's College, Cambridge, and Bishop of Bath and Wells, appeared about 1566. Drama now improved rapidly, and was soon to attain perfection in Shakespeare. Marlowe, Kyd, Greene, Lyly, Nash, Lodge, and Peele all helped to prepare the way. The greatest of these is Marlowe, who died at the age of twenty-nine, leaving behind him the great plays *Tamburlaine* (1588), *Faustus*, and *Edward II.* In his development of blank verse he contributed greatly to the success of the drama. The earliest tragedy, *Gorboduc* (1562), is incredibly stiff and wooden in its versification. Marlowe made of blank verse an instrument that would sound any note of pathos or sublimity. In the plays of Shakespeare (1564–1616) drama reached its greatest height. In comedy, tragedy, history, in handling dramatic situations, and in liquid perfection of verse, he is supreme. Like the very greatest masters, he founded no school, and his contemporaries owe little to him. While they are all put in the shade by his myriad-minded genius, they are all partakers with him in the glory of their age, and are all great in themselves. Jonson (1573–1637) is one of the most important, as he to some extent founded a school and exercised considerable influence over later writers. He was a scholarly and laborious playwright, who

over-elaborated some of his work, but who was a masterly adept at constructing a play, and a vigorous realist. Chapman (1559–1634), Dekker (1570–1641), and Marston (1575–1634) were all good workmanlike dramatists. The so-called Beaumont and Fletcher (q.v.) plays contain much powerful and lively work. Middleton, Webster, Tourneur, Thomas Heywood, and Massinger are all excellent in their way, Massinger in particular being a master of stage-craft. Shirley and Ford conclude the list of the great Jacobean dramatists. The Puritans caused the theatres to be closed in 1642.

Spanish and French Drama.—Meanwhile a similar outburst of dramatic activity was taking place on the Continent. In Spain, Lope de Vega (1562–1634) wrote a prodigious quantity of plays, and wrote them with much brilliance. Calderon wrote some beautiful plays, several of which have been translated by Edward Fitzgerald. Cervantes, though much better known as a novelist, wrote many good plays. The Spanish school directly inspired Corneille (1606–1684) to write his play *Le Cid*, and so begin the great age of classical French tragedy. Racine (1639–1700) is the other great name. French classical drama, though somewhat fettered by its observance of laws that were wrongly considered essential, is extremely dignified and beautiful. In Molière (1622–1673) France possesses the greatest of all writers of society comedies. He is as supreme in his kingdom as Shakespeare is in his empire.

Restoration Drama.—Restoration comedy was largely based on Molière, was brutalized by Wycherley, and adapted but not improved by Congreve. Congreve was, however, a master of sparkling dialogue, and in one play, *The Way of the World*, he has shown himself not unworthy of comparison with his master. Vanbrugh and Farquhar are the other two important writers of comedies. Restoration tragedy is much less important than Restoration comedy. Otway, Lee, and Southerne are its chief exponents.

Eighteenth Century Drama.—Some of these dramatists bring us into the eighteenth century, which was not on the whole prolific in good plays. Fielding wrote many amusing farces, but all were more or less hack-work. At a later period Foote, Cumberland, and the two Colmans

wrote good acting plays, which have not lived. The two plays of Goldsmith and several of the plays of Sheridan still hold the stage. Sheridan owed much to the Restoration dramatists, especially Vanbrugh, but as he improved his originals in many respects, and made them much more presentable in decent society, he is entitled to most of the reputation he long enjoyed.

In France, Marivaux (1678–1763) wrote sentimental comedies, while Beaumarchais, whose own life was more exciting and varied than most plays, wrote comedies with brilliant plots. In Italy, Maffei, Goldoni, and Alfieri are notable dramatists; the last named wrote propaganda in the disguise of tragedy. In Germany, Lessing by precept and example inaugurated the 'romantic movement'; Schiller and Goethe are the two greatest names associated with the stage. *Wallenstein* in particular is a good chronicle-play, while *Faust* is considered one of the greatest of all German plays.

Nineteenth and Twentieth Century Drama.—Victor Hugo led the Romantic movement in France, and wrote many great plays, such as *Hernani* and *Ruy Blas*. De Musset wrote his plays, which he called *proverbes*, under the same influence, and later followers of this school are Rostand and the Belgian M. Maurice Maeterlinck. The French dramatists Augier, Scribe, and Sardou had an overwhelming influence on the English stage, not altogether for its good. English drama was at a low ebb in the middle of the nineteenth century. Lytton's plays, though sometimes performed still, are extremely theatrical. Boucicault, who made a great success by dramatizing 'the pathos of Paddy', is not a great writer. H. J. Byron was an inveterate punster and writer of burlesques of no value. One of his plays, *Our Boys*, was acted for many years. Robertson is the most outstanding author of what is known as 'the cup and saucer' school of comedy. His plays are very much acting plays; they are not literature, and are quite removed from real life. Gilbert was a man of great gifts, but though some of his farces and comedies are good, he was not a master of drama as he was of *libretti* writing. Sir A. W. Pinero began his career as a dramatist under the ægis of Robertson, but continued it under that of Ibsen. Ibsen

(1828–1906) exercised a not altogether wholesome influence upon English drama for a considerable time. His plays are extremely well-constructed, and he refused to tolerate many conventions, such as asides and soliloquies. Pinero, after writing several farces, wrote *The Second Mrs. Tanqueray* (1893), a masterpiece after the style of Ibsen. H. A. Jones (born 1851) has written many excellent and extremely powerful plays, of which the best known are *The Liars* and *The Case of Rebellious Susan*. G. Bernard Shaw (born 1856) has written some amusing plays, though others have been spoilt by his tendency to turn them into propaganda. Galsworthy has written plays of great earnestness; in some he has neglected the Aristotelian maxim that every play must have a beginning, a middle, and an end. Sir James Barrie has written several delightful plays, and in one at least, *Peter Pan*, he has made a bid for immortality. The Abbey Theatre, Dublin, produced one dramatist of exceptional talent, J. M. Synge (1871–1909), and several competent playwrights, of whom Lady Gregory is perhaps the chief. The Birmingham Repertory Theatre brought John Drinkwater (1882–) to the fore; his play *Abraham Lincoln* gave a great impetus to historical drama. The comedies of Somerset Maugham (1874–) have something of the Congrevean sparkle. Other recent dramatists of note are Stanley Houghton (1881–1913), Arnold Bennett (1867–1931), H. H. Davies (1876–1917), Alfred Sutro (1863–), and R. C. Sherriff (1896–).

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Drama, a department and town of Greek Macedonia. The department has an area of 2200 sq. miles and a pop. (1928) of 111,572. The town, which is the centre of a great tobacco-growing area, has sesame-oil factories and tanneries, and a pop. of 15,263.

Drammen, a seaport of Norway, on the Drammen, at its mouth in the Drammenfjord. It has manufactures of leather, soap, ropes, sailcloth, earthenware, and tobacco, and is the second port in the

kingdom for the export of timber. Vessels drawing 25 feet can enter the port, which has all cargo and repair facilities, and which is kept open in winter by icebreakers. Pop. 26,204.

Draughts, a game resembling chess played on a board divided into sixty-four checkered squares. The game does not offer the same scope for brilliance and originality as the sister game of chess, but still is much more profound than is generally supposed. Among famous players are: Andrew Anderson of Carlisle, who published a celebrated work on the game in 1852; James Wyllie, the 'Herd Laddie', who was for many years world's champion; Robert Martins, English champion about 1870, who played several matches with Wyllie; James Ferrie of Coatbridge, who in 1894 defeated Wyllie and became champion, to be defeated in turn by Richard Jordan of Edinburgh in 1896; Robert Stewart of Fifeshire, many times Scottish champion and at present world's champion.

Several international matches have taken place between Scotland and England. The first, in 1884, was won by Scotland. In 1905 a very strong British team visited America and decisively defeated a side representing the United States, but the tables were completely turned in a similar match played in 1927.

Drava, a European river which rises in Tirol, flows through Illyria and Styria, and between Hungary and Yugoslavia, and joins the Danube 14 miles east of Essek after a course of 400 miles. It is navigable for about 200 miles.

Dravidian, a term applied to the vernacular tongues of the great majority of the inhabitants of Southern India, and to the people themselves who inhabited India previous to the advent of the Aryans. The family consists of the Tamil, Telugu, Canarese, Malayalam, Tulu, Tuda, Gond, Rajmahal, Oraon, &c.

Drawing is the art of representing upon a flat surface the forms of objects, and their positions in relation to each other. The great schools of painting all show excellent drawing, though differing in character. In Italy the Florentine school combined study of the antique with anatomical research, and produced many vigorous and expressive draughtsmen, notably Michelangelo and Leonardo da Vinci. The Roman school, under the

influence of Raphael, sacrificed vigour and expressiveness to elegance and the representation of ideal form. In the Lombard school a severe style of drawing is seen through harmonious colouring, and in the Venetian school the drawing is often veiled in the richness of the colour. The German and Dutch schools excel in a careful and minute style of naturalistic drawing, combined with good colour. The French school in the time of Poussin was very accurate in its drawing; at a later period its style betrayed a tendency to mannerism. David introduced, again, a purer taste in drawing and a close study of the antique, and these are qualities which distinguish his school (the so-called Classical school), of which Ingres is the leading representative, from the Romantic and Eclectic schools of a later period. The drawing of the British school is naturalistic rather than academic, but the work of Gainsborough and Alfred Stevens is comparable with that of earlier masters.

Drawings. Three methods are commonly made use of in preparing drawings. (1) Orthographic, which represents the subject under consideration in one plane only, and from which dimensions may be scaled off. (2) Perspective or radial projection is made use of by an architect for displaying the elevations of a building. (3) Isometric projection enables one to show the length, breadth, and thickness of an object drawn to scale on the one drawing. Measurements may be directly scaled from it, and lines which are parallel in the object are also parallel in the drawing.

Drayton, Michael (1563-1631), English poet. The poem by which his name is chiefly remembered is his *Polyolbion*, a sort of topographical description of England. Other works are his *Nymphidia*, *the Court of Fairy*; *The Barons' Wars*; *The Legend of Great Cromwell*; *The Battle of Agincourt*; besides numerous legends, sonnets, and other pieces.—Cf. O. Elton, *Michael Drayton: a Critical Study*.

Dreams, trains of ideas which present themselves to the mind during sleep. The usual content of dreams consists of aspirations or dreads, which the dreamer has recently entertained or experienced, mixed up with incidents which excited intense emotion at some earlier period of the individual's history, and especially in early childhood. The memory of un-

pleasant experiences, such, for example, as the horrors of trench warfare, which is repressed in the waking state, tends to force itself on the individual's attention when the conscious control is relaxed in sleep, and to give rise to disturbing dreams which may become so intense as to interfere with sleep and cause insomnia. The only rational remedy for this distressing trouble is to discover the painful incident and persuade the patient frankly to face it and not 'try to forget'. In recent years S. Freud has placed the study of dreams upon a scientific basis. He maintains that dreams represent the fulfilment of wishes.—BIBLIOGRAPHY: Havelock Ellis, *The World of Dreams*; S. Freud, *The Interpretation of Dreams*.

Dredging, a term applied to the operation of removing mud, silt, and other deposits from the bottom of harbours, canals, rivers, docks, &c. The most simple dredging apparatus consists of a strong iron ring or hoop which scoops the matter at the bottom into a large leather perforated bag. The oyster dredger is of this form. The steam dredger has a succession of strong iron buckets on an endless chain, which travels on a frame whose lower end is vertically adjustable so as to regulate the depth at which it works. The buckets tear up the matter at the bottom, raise it, and discharge it into punts or hoppers close to the dredging vessel. Steam-pump dredgers, in which suction-pipes are the chief features, are also used. Dredging rivers for gold is now largely carried on. The operation of dragging the bottom of the sea for molluscs, plants, and other objects, usually for scientific observation, is also called dredging, and has assumed great importance.

Drenthe, a province of Holland; area, 1028 sq. miles. The soil is generally poor, and the surface largely consists of heath and morass, but the province is famed for its horses and cattle. Drenthe is remarkable for the great number of so-called 'giants' graves' or barrows scattered over the country. Its capital is Assen. Pop. 216,248.

Dresden, the capital of the Republic of Saxony, is situated on both sides of the River Elbe, which is here spanned by four stone bridges and an iron railway bridge. Among the principal buildings are the palace, containing in the Green Vault a collection of jewels, works of art, &c.;

the museum, in which is a famous picture-gallery (Zwinger); the Japanese Palace (Augusteum), containing the royal library; the Johanneum, or museum of porcelain; and the theatre, one of the finest in the world. The city is famous for its educational, literary, and artistic institutions. The manufactures include pianos, chemicals, scientific instruments, &c. Dresden china is made at Meissen, 14 miles away. The commerce is considerable, and has greatly increased since the development of the railway system. The chief glory of Dresden is the gallery of pictures, which contains 3000 fine specimens of the Italian, Dutch, and Flemish schools, and over 350,000 engravings. There is also a sculpture-gallery, the Albertinum, where the progress of sculpture is exemplified from the earliest times. Dresden, being thus rich in treasures of art and favoured by a beautiful natural situation, is the summer-resort of many foreigners. Pop. (1928), 619,157.—The *division* of Dresden has an area of 1674 sq. miles, and a pop. of (1928) 1,393,026.

Dreux, a French town, department of Eure-et-Loir, on the Blaise. It is built at the foot of a hill crowned by a castle which contains a chapel, in which is the mausoleum of the Orleans family. Pop. 10,692.

Dreyfus, Alfred (1859–), captain of artillery and general staff-officer in the French Army, was born of a Jewish family in Mulhouse, Alsace. In Oct., 1894, he was arrested on a charge of communicating military documents to a foreign Government, and condemned to public degradation and lifelong imprisonment. In Jan., 1898, one Esterhazy was charged by a brother of the condemned man with having written the *bordereau*, or memorandum, which was the chief document relied on by the prosecutors of Dreyfus, but was acquitted by a court-martial, though indubitably guilty. In June, 1899, the Cour de Cassation ordered a fresh court-martial to try Dreyfus. It found him guilty with extenuating circumstances. He was sentenced to ten years' imprisonment, but was pardoned by President Loubet almost immediately. In 1906, when Clemenceau was Prime Minister, the sentence was annulled, and Dreyfus was reinstated in the army (as major). Several times during the progress of the case France seemed on the verge of revolution, as the affair roused the anti-

Semitic and militarist party to a frenzy. In Sept., 1919, Lieutenant-Colonel Dreyfus was publicly presented with the insignia of an officer of the Legion of Honour.

Driffield, Great, a town, England, Yorkshire, at the head of a navigable canal communicating with the Humber at Hull. Pop. (1931), 5916.

Drift, in geology, a term applied to earth and rocks which have been conveyed by flood-action, glaciers, or floating ice and deposited over the surface of a country. It is sometimes used in a wider sense to denote all post-Pliocene sands, gravels, and clays, such as the superficial deposits shown on the 'drift' maps of the Geological Survey.

Drill (*Papio leucophaeus*), a large variety of baboon, smaller than the mandrill, and like it a native of the coast of Guinea.

Drilling, the plan of sowing in parallel rows as distinguished from sowing broadcast. It was introduced into England by Jethro Tull, who invented the first implement for drilling, and published a work on the subject in 1731. The first form of drill was of very simple construction, and was only adapted for potatoes, beans, peas, carrots, clover, and cereals, sowing one row at a time, but now a great variety of improved implements is in use, some of which distribute artificial manure with the seed.

Drinkwater, John (1882—), English poet and dramatist. He was for many years a clerk with various assurance companies, and was instrumental in founding the Pilgrim Players, now the Birmingham Repertory Theatre. His works include several volumes of poetry, various critical papers, and the plays *Abraham Lincoln*, *Oliver Cromwell*, *Mary Stuart*, *Robert Burns*, and *Robert E. Lee*. He has also published *Mr. Charles, King of England*, *Charles James Fox*, and *All About Me*.

Driver, Samuel Rolles (1846–1914), English Biblical scholar. In 1883 he became Regius professor of Hebrew at Oxford. Of his numerous works we may mention: *Isaiah: his Life and Times*, *Introduction to the Literature of the Old Testament*, and *Sermons on Subjects connected with the Old Testament*.

Drogheda, a seaport, Irish Free State, in the county of Louth, on both sides of the Boyne, about 4 miles from the sea. Flax- and cotton-spinning are carried on; there are also salt-works, breweries, and

tanneries; and the fisheries are increasing. There is a good export trade in cattle, sheep, grain, butter, and eggs. Vessels of 17 feet draught can be accommodated in the harbour. Pop. (1926) 12,688.

Drohobycz, a Polish town in Galicia, 40 miles s.s.w. of Lemberg. It has an important trade, particularly in salt obtained from springs in the vicinity. Pop. 40,000.

Droitwich, a borough of England, in Worcester, on the Salwarp. It is famous for its brine springs, from which salt has been manufactured for more than 1000 years. Pop. (1931), 4553.

Drôme, a south-east department of France, covered almost throughout by ramifications of the Alps; area, 2532 sq. miles, of which about one-fourth is waste, one-third under wood, and a great part of the remainder under tillage and pasture. A considerable extent of the area is occupied by vineyards, and several of the wines produced have a high reputation, especially Hermitage. Olives, chestnuts, and silks are staple productions. Valence is the capital. Pop. (1926), 263,750.

Dromedary. See *Camel*.

Dromore, an episcopal city, Northern Ireland, County Down, on the Lagan, here crossed by two bridges. Pop. (1926) 2229.

Dropsy (Edema) is an accumulation of serous fluid in the tissue spaces and cavities of the body. Different names are given to such accumulations in particular areas, thus *anasarca* in the limbs and body generally; *ascites* in the peritoneal cavity (abdomen); *hydrothorax* in the pleural cavity (lungs); *hydrocephalus* in the brain. The commonest cause of dropsy is heart disease. It also appears in diseases of the kidneys and liver.

Drop-wort, *Spiræa filipendula*, nat. ord. Rosaceæ, a British plant of the same genus as queen-of-the-meadow, found in dry pastures.

Droseraceæ, a natural order of polypetalous Dicotyledons, consisting of insectivorous marsh herbs, and including the sundew (*Drosera*) and Venus's fly-trap (*Dionæa*).

Drowning. For the restoration of the apparently drowned several methods are suggested. Those of Dr. Silvester, recommended by the English Humane Society, and Dr. Benjamin Howard, of New York, will be described.

Whichever method is adopted, the

following steps must first and immediately be taken. Pull the body up on to dry ground. Send immediately for medical assistance, warm blankets, dry clothing, brandy, and hot water. No delay must be permitted, however, in treating the drowned, so that if only one person is on the spot he must begin to treat the victim *instantly*, without seeking assistance. Remove all clothing from the neck

produce the entrance and outflow of air from the lungs by Sylvester's or Howard's method.

Sylvester's method: Stand or kneel behind the person's head, grasp each arm at the elbow, draw both arms simultaneously upwards till they are extended in line with the body, as a man places them when he stretches himself. Let this movement occupy about two seconds. This enlarges the chest and causes the entrance of air to the lungs. Without a pause carry the arms down to the sides, making them overlap the chest a little, and firmly press them on the chest. This movement should also occupy two seconds. It expels air from the lungs. Repeat the movements, and maintain them steadily and patiently at the rate of fifteen times a minute, until breathing has been fully restored, or until medical aid arrives, or until death is certain. An hour is not too long a time to persist, and so long as there seems the least effort to breathe the movements must be persevered in.

Howard's method: Place the body on its face, with the roll of clothing under the stomach, the head being supported on the arm as shown in fig. 1. Pull the body over the roll of clothing to expel water from the chest. Then turn the body on the back, the shoulders being supported as shown in fig. 2. Kneel over the body. Place both hands on the lower part of the



Fig. 1

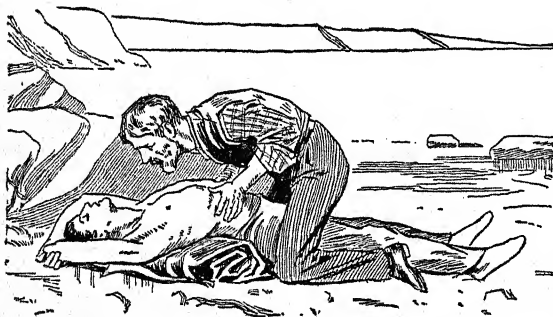


Fig. 2

Howard's method for restoring the apparently drowned

and chest. Fold the articles of dress removed so as to make a firm pillow, which is to be placed under the shoulders, so that the upper part of the body is slightly raised and the head slightly thrown back. Cleanse the mouth and nostrils, open the mouth and pull forward the tongue. If natural efforts to breathe are made, try to stimulate them by brisk rubbing of the sides of the chest and of the face. If no effort to breathe is made, proceed to

chest, so that the thumbs hook in under the lowest ribs and the fingers are spread out on the chest. Steadily press forwards, raising the ribs, your own body being thus thrown leaning forward. This enlarges the cavity of the chest and causes air to enter. When the ribs have been raised to the utmost extent, with a slight effort push yourself back to the more erect position, allowing the ribs to recoil to their former position. This expels the air.

Repeat the process fifteen times a minute. One person will find it more easy to maintain this method for a prolonged period than Silvester's, especially if the patient be big and heavy.

Meanwhile, if other persons are present they should be occupied rubbing the body and limbs (*always upwards*) with hands or warm flannel, applying hot flannels, bottles, &c., to the limbs, feet, arm-pits, &c. As soon as the person is sufficiently restored to be able to swallow, give small quantities of hot brandy and water, hot wine and water, hot coffee, &c., and use every effort to restore and maintain warmth.

Droylsden, a town of England, Lancashire, practically a suburb of Manchester. There are cotton-factories and chemical-works. Pop. (1931), 13,277.

Druids, the priests of the Celts of Gaul and Britain. According to Julius Caesar, they possessed the greatest authority among the Celtic nations. They had some knowledge of geometry, natural philosophy, &c., superintended the affairs of religion and morality, and performed the office of judges. They venerated the mistletoe when growing on the oak, a tree which they likewise esteemed sacred. Of their religious doctrines little is known.

Drum, a musical instrument of percussion. Drums are of three kinds: (1) the long or bass drum played with stuffed-nob drumsticks, and used only in large orchestras or military bands; (2) the side-drum, having two heads, the upper one only being played upon by two sticks of wood; (3) the kettledrum, a hemisphere of brass or copper, the end of which is covered with parchment.

Drumclog, a moorland tract in Lanarkshire, Scotland, 6 miles south-west of Strathaven, the scene of a skirmish between Claverhouse and the Covenanters, in which the former was defeated (1679).

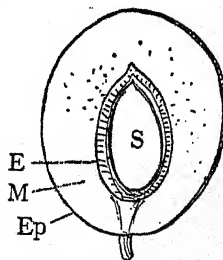
Drummond, Henry (1851–1897). Scottish biologist and theologian. His most remarkable work is *Natural Law in the Spiritual World* (1883), which has passed through many editions and been translated into various languages. He is author, also, of *Travel Sketches in Our New Protectorate*, *The Greatest Thing in the World*, and *The Ascent of Man* (1894).

Drummond, William, of Hawthornden (1585–1649), Scottish poet. He lived for the most part in retirement at Hawthornden, where he entertained Ben Jonson in

Jan., 1619, and took notes of Jonson's conversation (printed in full 1923). His chief productions are: *A Cypress Grove*, in prose, containing reflections upon death; *Flowers of Zion, or Spiritual Poems*; *The River Forth Feasting*; and *History of the Lives and Reigns of the Five Jameses, Kings of Scotland*. As an historian he is chiefly remarkable for an ornate style, and a strong attachment to the High Church principles of the Jacobites.

Drunkards, Habitual. The Habitual Drunkards Act of 1879 provided for the licensing of retreats for receiving habitual drunkards, and for the regular inspection of such retreats. An habitual drunkard desiring admission to a retreat had to make a written application, accompanied by a declaration of two persons that the applicant was an habitual drunkard, and attested by two justices of the peace. No patient in a retreat was permitted to leave before the expiration of the term stated in the application, such term not to exceed one year. This Act was to expire in ten years; but another Act, passed in 1888, made it permanent, with some modifications. The Inebriates Act of 1898 introduced several important changes. It transferred the licensing power in counties from justices of the peace to county councils and their committees, and in boroughs from magistrates to town councillors or police commissioners. The maximum period of detention was extended to two years, and the attestation of one justice was made sufficient for a valid application. The Inebriates Act of 1899 was very short, and made no important change in the law.

Drupe, in botany, a stone fruit; a fruit in which the outer part of the pericarp becomes fleshy or softens like a berry while the inner hardens like a nut, forming a stone with a kernel, as the plum, cherry, apricot, and peach. The stone enclosing the kernel is called the *endocarp*, while



Section of Plum

S, Seed. E, Endocarp, or shell. M, Mesocarp, or intermediate layer. Ep, Epicarp or skin.

the pulpy or succulent part is called the *mesocarp*. In some fruits, as those of the almond, the horse-chestnut, and coco-nut, the mesocarp is not succulent, yet, from their possessing the other qualities of the drupe, they receive the name.

Druses, a people of mixed Syrian and Arabian origin, inhabiting the mountains of Lebanon and Anti-Lebanon, and also the Hauran (south-west of Damascus). In their faith are combined certain Jewish, Christian, and Mahommedan doctrines, but they believe in one God, who is expected to appear as the Messiah. They are nearly all taught to read and write. Their total number is estimated at 100,000. They are very friendly to the English, but a serious revolt against the French took place in 1925. See *Syria and Lebanon*.

Drusus, the name of several distinguished Romans, among whom were: *Marcus Livius*, who became tribune of the people in 122 B.C. He opposed the policy of Gaius Gracchus, and became popular by planting colonies.—*Marcus Livius*, son of the above, rose to be tribune of the people, and was assassinated 91 B.C.—*Nero Claudius* (38 B.C.—9 B.C.), brother of the Emperor Tiberius. By a series of brilliant campaigns he extended the Roman Empire to the German Ocean and the River Elbe, and was hence called *Germanicus*.

Dryden, John (1631–1700), English poet. He was educated at Westminster, and at Trinity College, Cambridge. In 1661 he produced his first play, *The Duke of Guise*; but the first that was performed was *The Wild Gallant*, which appeared in 1663 and was not a success. This was followed by *The Rival Ladies*, *The Indian Queen*, and *The Indian Emperor*. In 1666 he wrote the *Annus Mirabilis*, a poetical account of the events of that year. In 1668 he published his *Essay on Dramatic Poesy*—the first attempt to regulate dramatic writing. In 1668 *The Maiden* drama, a tragi-comedy, was represented. This was followed in 1670 by *The Tempest*, an alteration from Shakespeare, in which he was assisted by Sir William Davenant. Dryden was shortly afterwards appointed to the offices of Historiographer Royal and Poet Laureate, with a salary of £200 a year. The first of his political and poetical satires, *Absalom and Achitophel* (Monmouth and Shaftesbury), was produced in 1681, and was followed by *The*

Medal, a satire against sedition, and *Mac Flecknoe*, a satire on the poet Shadwell. In 1682 he published a poem called *Religio Laici*, wherein he maintained the doctrines of the Church of England. On the accession of James in 1685 Dryden became a Roman Catholic. He defended his new religion at the expense of the old, one in a poem, *The Hind and the Panther*. At the Revolution Dryden was deprived of the offices of Poet Laureate and Historiographer. His poetic translation of Virgil appeared in 1697, and, soon after, the well-known lyric *Alexander's Feast*, and his *Fables*. Dryden is unequalled as a satirist among English poets. His poetry as a whole is more remarkable for vigour and energy than beauty, but he did much to improve English verse. He was also an admirable prose writer, and a critic of the greatest ability.—**BIBLIOGRAPHY**: R. Garnett, *Age of Dryden*; G. Saintsbury, *Dryden*.

Drying-machine, a machine consisting of any number of steam-heated cylinders up to thirty or even more, each about 22 inches in diameter, and used in bleachworks, dye-houses, and in cloth-finishing departments. Each cylinder is provided with some type of safety air-valve, which yields to allow air to enter in proportion as the steam is condensed in the cylinder. The condensed steam is withdrawn, so that the interior may be as dry as possible. The cloth, either from the squeezing-rollers of the starch-mangle or from a loose or rolled state of cloth from some other machine, is conducted over guide-rollers, then under and over the two rows of steam-heated cylinders, and finally led from the last cylinder to the roller of a plaiting-down apparatus, or otherwise delivered. Another type of drier, working on the centrifugal principle, is largely used in public washing-houses.

Dry-point. See *Etching*.

Dry-rot, a well-known disease affecting timber, occasioned by various species of Fungi, the mycelium of which penetrates the timber, destroying it. *Merulius lacrymans*, which is found chiefly in firwood, is the most common and most formidable dry-rot fungus in Britain. Various methods have been proposed for the prevention of dry-rot; that most in favour is thoroughly saturating the wood with creosote, which makes the wood unfit for vegetation, but proper ventilation is the surest safeguard.

Dualism. See *Metaphysics*.

Dubail, Augustin Edmond (1851–), French general. He commanded the First Army operating in Alsace-Lorraine in 1914, and successfully defended Nancy. He was Military Governor of Paris from 1915 to June, 1918.

Du Barry, Marie Jeanne Bécu, Comtesse (1743–1793), mistress of Louis XV. She exercised a powerful influence at Court, and with some of her confidants completely ruled the king. After the death of Louis she was dismissed from Court and sent to live in a convent near Meaux. During the reign of terror she was arrested as a Royalist and executed.

Dublin, the chief city of the Irish Free State, is situated in County Dublin at the mouth of the Liffey. The river, which divides the city into two unequal parts, is crossed by numerous bridges. The principal street, at right angles to the river, is O'Connell Street, forming a thoroughfare which is continued across the river by O'Connell Bridge. There are many fine buildings, including the castle, the Bank of Ireland, and Trinity College. The most important educational institutions are Trinity College (Dublin University), the National University of Ireland, the Royal College of Science, and the College of Surgeons. Dublin contains two Protestant Episcopal cathedrals—St. Patrick's Cathedral and Christ's Church—and there is also a Roman Catholic Cathedral. A little north-west of the city, up the Liffey, is the Phoenix Park, with an area of 1759 acres. In it stands the official residence of the Governor-General. The manufactures are of little note, poplins being the most important. Brewing and distilling are largely carried on. Dublin is a busy port, and carries on a large export trade in live-stock, dairy produce, whisky, beer, artificial manures, and general merchandise. The harbour is protected by breakwaters running far into Dublin Bay, and the quay length (mainly on the banks of the Liffey) is $3\frac{1}{2}$ miles. Vessels drawing 30 feet can enter the harbour. Serious risings occurred in Dublin at Easter, 1916, in 1919, 1920, and 1921. Pop. (1926) including suburbs 419,156.

Dublin, a county of the Irish Free State, province of Leinster, has an area of 218,873 acres, about a third of it under crops. The surface on the whole is flat, but the ground rises at its southern

boundary into a range of hills, the highest of which is Kippure (2473 feet). There are about 70 miles of sea-coast, the chief indentation being Dublin Bay. The principal stream is the Liffey. The Royal and the Grand Canals, both centring in Dublin, unite the Liffey with the Shannon. The manufactures are unimportant, but the fisheries are extensive. Pop. (1926) 189,248. Dublin (county borough), 316,471.—Cf. D. A. Chart, *The Story of Dublin*.

Dublin, University of, an institution founded in 1591, when a charter, or letters-patent, was granted by Queen Elizabeth for the incorporation of the "College of the Holy and Undivided Trinity", the University and Trinity College being practically the same. The B.A. degree is given after examination in the usual subjects, and may be a pass or honours degree; the M.A., as at Oxford and Cambridge, is gained by the payment of a fee after a certain time has elapsed. All Dublin degrees are interchangeable with those of Oxford and Cambridge. The college possesses a library of about 370,000 printed volumes and 1700 manuscripts. It has also a botanic garden and museum. The number of students in 1929 was 1309.

Dubno, a town of the Ukraine, government of Volhynia. The industries are tanning and the manufacture of tobacco. There are two important fairs every year. Pop. 14,000.

Dubois, Guillaume (1656–1723), French cardinal. He became Privy Councillor and Minister for Foreign Affairs under the regency. By his consummate address he obtained a cardinal's hat, and in 1721 was appointed Prime Minister.

Dubois, Paul (1829–1905), French sculptor. Among his works are a *St. John*, *Eve Awakening to Life*, a figure of *Song* for the opera-house at Paris, and numerous busts; but his greatest work is the monument of General Lamoricière in the Cathedral of Nantes, with figures of *Military Courage*, *Charity*, *Faith*, and *Meditation*.

Du Bois-Reymond, Emil (1818–1896), German physiologist. His principal publication is *Researches in Animal Electricity*.

Dubovka, a town of South Russia, government of Saratov, on the Volga; it has an extensive river trade in wool, iron, mustard, salt, oil, and grain. Pop. 16,530.

Dubuque, a city of Iowa, U.S.A., on

the right bank of the Mississippi. It is an important railway centre and entrepôt for the agricultural and mineral products of the northern half of Iowa and the timber of Wisconsin. There are valuable lead-mines in its vicinity. Pop. 39,141.

Ducange, Charles Dufresne, Sieur (1610–1688), French historian and linguist. He is chiefly famous for his *Glossaries of the Greek and Latin peculiar to the Middle Ages and the Moderns*.

Ducas, Michael, Byzantine historian, flourished in the fifteenth century. His *Historia Byzantina* was largely used by Gibbon.

Du Chaillu, Paul Belloni (1835–1903), traveller. In 1855 he began his first journey through Western Africa, and stayed till 1859, travelling on foot upwards of 8000 miles. An account of this journey, *Explorations and Adventures in Equatorial Africa*, was published in 1861. A second expedition was made in 1863, an account of which, under the title *A Journey to Ashango Land*, appeared in 1867.

Duchesne, or **Du Chesne**, André (1584–1640), French historian. His most important works are his collection of French historians—*Historiæ Francorum Scriptores*; *Historiæ Normanorum Scriptores* 838–1220; *Histoire d'Angleterre, d'Écosse, et d'Irlande*; *Histoire des Papes*.

Duck, the name given to web-footed birds constituting the sub-family Anatinae of the family Anatidae, which also includes swans and geese. The common mallard or wild-duck (*Anas boschas*) is the original of the domestic duck. In its wild state the male is characterized by the deep green of the plumage of the head and neck, by a white collar separating the green from the dark chestnut of the lower part of the neck, and by having the four middle feathers of the tail recurved. Among favourite domestic ducks are Normandy, Picardy, and Aylesbury—this last being a special English favourite. Other species of the sub-family are: shoveller (*Spatula chlypeata*), garganey (*Querquedula ciria*), pintail or sea-pheasant (*Dasila acuta*), teal (*Nettion crecca*), widgeon (*Marca penelope*), gadwall (*Chaulelasmus streperus*), sheldrake (*Tadorna cornuta*), and tree-ducks (species of *Dendrocygna*). In a wider sense the name 'duck' is applied to species of other sub-families of the

Anatidae as follows: Merganettinae, e.g. the blue duck of New Zealand; Eristaturinae, e.g. the musk duck of Tasmania and Australia; Fuligulinae, e.g. the eider duck, the black duck, the harlequin duck, scaup, canvas back; Plectopterinae, e.g. the summer duck of North America, the mandarin duck of Eastern Asia, and the Muscovy or musk duck.

Duckweed, the popular name of several species of Lemna, nat. ord. Lemnaceae, plants growing in ditches and shallow water, floating on the surface.

Ductility, the property of solid bodies, particularly metals, which renders them capable of being extended by drawing. The following is nearly the order of ductility of the metals which possess the property in the highest degree, that of the first mentioned being the greatest: gold, silver, platinum, iron, copper, nickel, palladium, cadmium, zinc, tin, lead.

Du Deffand, Madame. See *Deffand*.

Dudevant, Madame. See *Sand, George*.

Dudley, Robert, Earl of Leicester. See *Leicester*.

Dudley, a borough in an isolated part of Worcestershire enclosed by Staffordshire. It has extensive coal-mines, iron-mines, ironworks, and limestone quarries. It produces nails, chain-cables, anchors, vices, boilers, fire-irons, and has also glassworks, brickworks, and brass-foundries. Pop. (1931), 59,579.

Duel, a premeditated and prearranged combat between two persons with deadly weapons, for the purpose of deciding some private difference or quarrel. The combat generally takes place in the presence of witnesses called seconds, who make arrangements as to the mode of fighting, place the weapons in the hands of the combatants, and see that the laws they have laid down are carried out. France was the country in which the duel arose, the sixteenth century being the time at which it first became common, especially after the challenge of Francis I to Charles V in 1528. The practice of duelling was introduced into England from France in the reign of James I; but it was never so common as in the latter country. As society became more polished duels became more frequent, and they were never more numerous than in the reign of George III. Among the principals in the chief duels of this period were Charles James Fox, Sheridan, Pitt, Canning, Castlereagh, the

Duke of York, the Duke of Richmond, and Lord Camelford. By English law fatal duelling is considered murder, no matter how fair the combat may have been, and the seconds are liable to the same penalty as the principals. An officer in the army having anything to do with a duel renders himself liable to be cashiered.—BIBLIOGRAPHY: Millingen, *History of Duelling*; Steinmetz, *Romance of Duelling*.

Duff, Alexander (1806–1878), Scottish missionary. In 1829 he set out for India as the first Church of Scotland missionary to that country. He opened a school in which he taught successfully the doctrines of Christianity, and assisted in founding the University of Calcutta. His chief writings are: *The Church of Scotland's India Mission* and *India and India Missions*.

Duff, Sir Mountstuart Elphinstone Grant (1829–1906), writer on political and other subjects. He was Under-Secretary for India in W. E. Gladstone's ministry from 1868 to 1874, and Under-Secretary for the Colonies from 1880 to 1881, in which year he was appointed Governor of Madras. His published works include: *Studies in European Politics* (1866), *Notes of an Indian Journey* (1876), and *Notes from a Diary* (7 vols., 1897–1905).

Dufferin and Ava, Frederick Temple Hamilton-Blackwood, Marquess of (1826–1902), British statesman and author. He was Under-Secretary of State for India (1864–1866); Under-Secretary for War (1866); Chancellor of the Duchy of Lancaster (1868–1872); Governor-General of Canada (1872–1878); Ambassador at St. Petersburg (1879–1881), at Constantinople (1882); sent to Cairo to settle the affairs of the country after Arabi Pasha's rebellion (1882–1883); Viceroy of India (1884–1888); Ambassador to Italy (1889–1891), to France (1891–1896). He wrote *Letters from High Latitudes* (1860), also various pamphlets on Irish questions.—Cf. Sir A. Lyall, *Life of the Marquess of Dufferin and Ava*.

Dufrénoy, Pierre Armand (1792–1857), French geologist and mineralogist. In 1841 he published a great geological map of France with three volumes of text. He introduced a new classification of minerals, based on crystallography.

Dugdale, Sir William (1605–1686), English antiquary. In concert with Roger Dodsworth he produced an important

work on English monasteries entitled *Monasticon Anglicanum*. Among his other works are: *Antiquities of Warwickshire*, and *The Baronage or Peerage of England*.

Dugong, a herbivorous mammal, the *Halicore dugong*, belonging to the order Sirenia, which also includes the manatees. It is a native of the Indian and Australian seas, and is said sometimes to attain a length of 20 feet, though generally it is about 7 or 8 feet in length. Its food consists of marine plants; it yields little or no oil, but is hunted by the Malays for its flesh.

Duguay-Trouin, René (1673–1736), French seaman. He signalized himself so much in the Spanish War that the king granted him letters of nobility, in which it was stated that he had captured more than 300 merchant ships and twenty ships of war. By the capture of Rio de Janeiro (1711) he brought the Crown more than 25,000,000 francs.

Du Guesclin, Bertrand (1314–1380), Constable of France. Mainly to him must be attributed the expulsion of the English from Normandy, Guienne, and Poitou.

Duikerbok, species of *Cephalophus*, small South African antelopes with short horns.

Duisburg, a town in Rhenish Prussia, 13 miles north of Düsseldorf. It has iron-manufactories, engineering-works, chemical-works, and cotton- and woollen-mills, and a large trade greatly facilitated by a canal communicating with the Rhine. It has extensive docks, and vessels drawing 12 feet reach the port via Amsterdam and Rotterdam. Pop. (1925), 272,798.

Duke, a title belonging originally to a military leader. In Britain it is the highest rank in the peerage. The first hereditary duke in England was the Black Prince, created by his father, Edward III, in 1336. A duke in the British peerage is styled 'your grace', or 'my Lord Duke'; his wife is a duchess. See *Address, Forms of; Coronet*.

Dukinfield, a municipal borough, England, county Cheshire. Collieries, cotton-factories, brickworks, and tileworks give employment to the population. Pop. (1931), 19,309.

Dulaim, a division of the vilayet of Baghdad, Iraq. Pop. 250,000.

Dulce, a lake of Guatemala, on the east coast, communicating with the Gulf of Honduras by the lakelet el Golfete. It

is about 30 miles long by 12 miles broad, and affords profitable turtle hunting.

Dulcigno, a small seaport in Montenegro, Yugoslavia, on the Adriatic. Pop. 5000.

Dulcimer, one of the most ancient musical instruments, used in almost all parts of the world. The modern instrument consists of a shallow trapezium-shaped box without a top, across which runs a series of wires, tuned by pegs at the sides, and played on by being struck by two cork-headed hammers.

Dulse, a reddish-brown seaweed, the *Rhodymenia palmata*, several inches long, found at low water clinging to rocks, and used in some parts of Scotland as food. In the south of England the name is given to the *Iridaea edulis*, also an edible red seaweed.

Duluth, a town of the U.S.A. in Minnesota, at the south-west extremity of Lake Superior. It has a magnificent natural harbour, is a leading commercial port (principal export, wheat), and has ironworks, flour-mills, and match-factories. The harbour is connected with Lake Superior by a canal 23 feet deep. Pop. 98,917.

Dulwich, a suburb of London, in county Surrey, about 5 miles south of London Bridge; noticeable on account of its school, *Dulwich College*, founded as a charitable institution in 1619 by the actor Edward Alleyn, and reconstituted in 1857. It now consists of two branches, the educational and the eleemosynary, between which the surplus revenue is divided in the proportion of three-fourths to the former and one-fourth to the latter. The educational branch comprises two schools, the upper and the lower. There are four boarding-houses, the fees are lower for certain privileged parishes, and there are a number of university scholarships and exhibitions. The eleemosynary branch maintains a certain number of resident and non-resident poor people. Dulwich College is celebrated for its pictures.

Duma, or **Douma**, the Lower House of the former Russian Parliament, the Upper House being the Council of the Empire. In 1905 Tsar Nicholas II granted his country a Constitution, promising that responsible government would be established, and that no law would be made effective without the consent of the Duma.

The first Duma accordingly met in 1906, but was dissolved as soon as it began to criticize the Deputies. The second Duma, though more conservative, met the same fate. The third Duma, which met in 1907, and whose members were mostly landed proprietors, retired officers, and priests, was absolutely subservient to the autocratic Government. The Duma ceased to exist on 7th Nov., 1917, when the Bolsheviks came into power.

Dumas, **Alexandre** (called *Dumas père*) (1803-1870), French novelist and dramatist. He soon began to write for the stage, and in 1829 scored his first success with his drama *Henri III et sa cour*. The same year appeared his *Christine*, and in quick succession *Antony*, *Richard d'Arington*, *Térésa*, *La Tour de Nesle*, *Catharine Howard*, and *Mlle de Belle-Isle*. Turning his attention to romance, he produced a series of historical romances, among which may be mentioned: *Le bâtard de Mauléon*; *Isabelle de Bavière*; *Les Deux Dianas*; *La Reine Margot*; *Les Trois Mousquetaires*, with its continuations *Vingt Ans Après* and the later *Vicomte de Bragelonne*. His *Monte-Cristo* and several others are also well known to English readers through translations. The works which bear his name amount to some 1200 volumes, including about 60 dramas; but the only claim he could lay to a great number of the productions issued under his name was that he either sketched the plot or revised them before going to press. Dumas was remarkable for his creative rather than for his artistic genius, and although he frequently squandered his gifts, he was admired by all sorts and conditions of men.—Cf. A. B. Davidson, *Alexandre Dumas père: his Life and Works*.

Dumas, **Alexandre**, son of the above (1824-1895), French novelist and dramatist. His first novels, *La Dame aux Camélias* and *Diane de Lys*, were very successful. His dramas, which are much superior to his novels, include: *Le demi-monde*, *Le fils naturel*, *L'Ami des femmes*, *La princesse Georges*, and *L'Étrangère*.

Du Maurier, **George Louis Palmella Busson** (1834-1896), British artist and writer. He succeeded Leech on *Punch*, and became famous chiefly through his drawings for that publication. He also illustrated various books, and wrote three novels, *Trilby*, *Peter Ibbetson*, and *The Martian*.

Dumbarton, a royal burgh and seaport, Scotland, chief town of Dumbarton county, on the Leven near its junction with the Clyde. Shipbuilding is carried on, and there are foundries and engine-works. The harbour is used by vessels of 1800 tons, but the trade by sea is now small. Pop. (1931), 21,546. A little to the south is the famous rock and castle of Dumbarton, rising above the Clyde to a height of 240 feet.

Dumbartonshire, a county of Scotland, partly maritime, consisting of two detached portions, the larger lying between the Clyde, Loch Long, and Loch Lomond, and the smaller being about 4 miles east of the former, and comprising only two parishes. More than half the area of the county is occupied by mountains, some of them attaining a height of upwards of 3000 feet. The lower lands are fertile, and in general well cultivated. More than one-half of Loch Lomond and fully two-thirds of the islands in it belong to Dumbartonshire. The Gareloch, an arm of the Firth of Clyde, forms a part of the county into a peninsula. The principal rivers are the Leven, from Loch Lomond, and the Kelvin, both belonging to the Clyde system. The chief minerals are coal, limestone, ironstone, and slate. On the banks of the Leven and elsewhere are extensive cotton-printing and -bleaching establishments, and there are extensive shipbuilding yards along the Clyde. Besides Dumbarton, the chief town, the county contains the towns of Helensburgh and Kirkintilloch, and the manufacturing villages of Alexandria, Renton, and Bonhill. Pop. (1931), 147,751.

Dumdum, a military village, India, province of Bengal, $4\frac{1}{2}$ miles E.N.E. of Calcutta. It has a Government ammunition factory. Pop. 12,000.

Dumdum Bullet, a hollow-nosed bullet which expands on impact, and so causes an ugly wound. It was used in Indian frontier fighting to stop the rushes of fanatical tribesmen. In the Declaration signed at The Hague, 29th July, 1899, Germany expressly promised not to use such bullets in warfare, but did not keep her promise in the European War.

Dumfries, a royal burgh and river-port, Scotland, capital of the county of same name, and the chief place in the south of Scotland, situated on the left bank of the Nith, about 6 miles from its

junction with the Solway Firth. It is connected with the suburb Maxwelltown (in Kirkcudbright) by three bridges, one dating from the thirteenth century. There are iron-foundries, hosiery- and tweed-factories, tanneries, and coach-building works. The River Nith is navigable to the town for vessels of under 60 tons. Burns spent his closing years here, and his remains rest under a handsome mausoleum. A statue of him was erected in 1882. Pop. (1931), 22,795.

Dumfriesshire, a county of Scotland, on the Solway Firth; area, 702,946 acres (about a third under cultivation). The surface is irregular, but for the most part mountainous, especially in the north and north-west districts. The dales of the Nith, Annan, and Esk contain fine pasture holms and good arable land. Oats, potatoes, and turnips are the most common products. Good cattle are reared, and are much in request for the English market. The sheep on the hill pastures are mostly Cheviots; on the lower and arable lands the Leicester breed prevails. The minerals most abundant are coal, lead, iron, antimony, and gypsum. Coal and lead are worked to a small extent. Its principal towns are Dumfries, Annan, Sanquhar, Lockerbie, Moffat, Langholm, and Lochmaben. Pop. (1931), 81,060.

Dumont, Pierre Etienne Louis (1759–1829), French political writer. He assisted Mirabeau in the composition of speeches and reports, and wrote some interesting *Recollections* of him. He is, however, chiefly remembered for his connexion with Bentham (q.v.), whose works he recast and edited in a form suitable for the general public.

Dumont d'Urville, Jules Sebastien César (1790–1842), French navigator. From 1826 to 1829 he commanded the corvette *Astrolabe*, which made surveys of the coasts of Australia and New Zealand. The result of this voyage was the publication of *Voyage de Découverte autour du Monde*. In 1837 he sailed with the *Astrolabe* and *Zélée* on a voyage of Antarctic discovery. On his return in 1840 he began the publication of *Voyage au Pôle sud et dans l'Océanie*, which was finished by one of his companions.

Dumouriez, Charles François Du-perrier (1739–1823), French general. At the Revolution he joined the Jacobins, and subsequently the Girondists, and in

1792 he was Minister of Foreign Affairs. War breaking out between France and Austria, he defeated the Austrians at Jemappes and conquered Belgium. Instead of prosecuting the war vigorously, he now entered upon measures for the overthrow of the Revolutionary Government, issued a proclamation, in which he promised the restoration of the constitutional monarchy in the person of the heir to the crown, but was attacked by the Versailles volunteers and compelled to flee (4th April, 1793). After many wanderings he settled (1804) in England, where he gave valuable advice to the War Office.—Cf. J. Holland Rose and A. M. Broadley, *Dumouriez and the Defence of England against Napoleon*.

Dünaburg, German name of *Dvinsk* (q.v.).

Dunbar, William (c. 1460—c. 1520), Scottish poet. In 1475 he went to St. Andrews, where, in 1477, he took the degree of B.A., and two years later that of M.A. After this he seems to have become a begging friar of the Franciscan order, and made journeys in England and France, but he returned to Scotland about 1490, and attached himself to the Court of James IV, from whom he received a pension of £10. On the marriage of James IV to Margaret of England, Dunbar celebrated the event in a poem of great beauty entitled *The Thrissil and the Rois*. His works, which consist of elaborate allegories, satirical and grimly humorous pieces, and poems full of brilliant description and luxuriant imagination, first collected by David Laing (Edinburgh, 1834), were edited by John Small and Æ. J. G. Mackay, for the Scottish Text Society, between 1884 and 1893. A one-volume edition by Dr. W. Mackay Mackenzie appeared in 1932.

Dunbar, a royal burgh and seaport of Scotland, East Lothian, on the North Sea. It is a place of great antiquity, and has the ruins of an old castle which was besieged several times. The harbour, though difficult of access, is very safe. The chief industries are fishing and the manufacture of rope and of agricultural implements. Pop. (1931), 3751.

Dunblane, an old episcopal city, Scotland, in Perthshire, on the Allan. The ancient cathedral, restored between 1890 and 1914, dates from the twelfth century. There are woollen-mills. Pop. (1931), 2692

Duncan, Adam, Viscount (1731—1804), British naval officer. In 1795 he was appointed commander of the North Sea fleet, and in Oct., 1797, won a brilliant victory over the Dutch fleet off Camperdown.

Duncan, Thomas (1807—1845), Scottish painter. His principal works were illustrative of Scottish history and character. Among the best known of them are: *The Abdication of Mary Queen of Scots*, *Charles Edward asleep in a Cave after Culloden*, and *The Martyrdom of John Brown of Priesthill*.

Duncansby Head, a promontory in Caithness-shire, Scotland, forming the north-east extremity of the Scottish mainland. Close by the promontory are two rocks of great height, called the Stacks of Duncansby.

Dundaik, a seaport, Irish Free State, capital of County Louth, on Castletown River. It has railway workshops, tanneries, and a spinning-mill; the trade, chiefly in cattle and agricultural produce, is extensive. Ships of 1000 tons reg. can enter the harbour. Pop. (1926) 14,007.

Dundee, John Graham of Claverhouse, Viscount (1650—1689). In 1677 he was appointed captain of a troop of horse raised to enforce compliance with the establishment of Episcopacy. He distinguished himself by an unscrupulous zeal in this service, especially after the murder of Archbishop Sharpe in May, 1679. The Covenanters defeated Claverhouse at Drumclog on 1st June. On the 22nd, however, the Duke of Monmouth defeated the insurgents at Bothwell Brig, and Claverhouse was sent into the west with absolute power. In 1682 he was appointed sheriff of Wigtownshire, and continued his persecutions. When James fled he retired to the north, followed by General Mackay. After making an attempt on Dundee, Claverhouse finally encountered and defeated Mackay in the Pass of Killiecrankie, but was killed in the battle.

Dundee, a city and seaport, Scotland, in the county of Angus, on the north shore of the Firth of Tay, about 8 miles from the open sea; in population the third town in Scotland. The most conspicuous building is St. Mary's Tower, 156 feet high, erected in the middle of the fourteenth century. There are several notable buildings and some fine public parks. University College was opened

in 1883, and affiliated to the University of St. Andrews in 1897. The town has long been celebrated for its textile manufactures, particularly those of the coarser descriptions of linen, and it is now the chief seat of the linen industry in Scotland and of the jute industry in Great Britain. Shipbuilding is extensively carried on, and there are large engineering establishments. It is also the centre of the northern seal and whale fishery. Dundee is famous for its marmalade and other preserves and confectionery. The shipping accommodation includes five large wet-docks, with tidal harbours and graving-docks, several river wharfs, and a fish dock and market. The chief foreign trade is with the Baltic and Archangel in the importation of flax and hemp, with Norway, Sweden, and Canada in timber, and with Calcutta in jute. The railway facilities were increased in 1887 by the opening of the Tay Bridge, 2 miles long. This replaced a bridge opened in 1878 and destroyed in a storm the following year. In 1914 the burgh of Broughty Ferry was annexed to Dundee, increasing its area to 5964 acres. Pop. (1931), 175,583.

Dundonald, Thomas Cochrane, tenth Earl of (1775–1860), British admiral. In 1800 he was appointed to the *Speedy* sloop-of-war of fourteen guns, and in the course of thirteen months captured over fifty vessels, but was at last captured himself. In 1805, while in command of the *Pallas* frigate, he took some rich prizes, and for the next four years in the *Impérieuse* performed remarkable exploits in cutting out vessels, storming batteries, and destroying signals. On his return to England he entered Parliament, and by his attacks on the abuses of the naval administration made himself obnoxious to the authorities. His enemies succeeded in 1814 in convicting him on a charge of being implicated in a notorious Stock Exchange fraud. He was expelled from Parliament, ignominiously ejected from the Order of the Bath, imprisoned for a year, and fined £1000. In 1818 he took service in the Chilean navy, his exploits greatly aiding the national independence of that country. In 1832 he was restored to his rank in the British navy. He was reinstated in the Order of the Bath (G.C.B.) on 25th May, 1847. He did much to promote the adoption of steam and the screw propeller in war-ships. He wrote an auto-

biography, which, though left incomplete, is a most interesting work.

Dunedin, capital of the provincial district of Otago, New Zealand, and the most important commercial town in the dominion, stands at the upper extremity of an arm of the sea about 9 miles from Port Chalmers. It is a great educational centre and has a university. There are many handsome buildings. Wool is the staple export. There are woollen- and boot-factories, refrigerating-works, and foundries. The harbour is generally known as Otago Harbour. Large vessels discharge and all repair work is done at Port Chalmers, but ships drawing under 22 feet 6 inches can proceed to Dunedin. Pop. (1927), 83,250.

Dunfermline, a royal burgh of Scotland, county of Fife. The town has greatly benefited through the munificence of the late Andrew Carnegie, a native, who, besides other benefactions, settled on it the sum of £500,000. In the manufacture of table-linen it is unrivalled by any town in the kingdom. There are also bleaching- and dye-works. The burgh now includes Rosyth. There are collieries adjacent. Pop. (1931), 34,954.

Dungannon, a town of Northern Ireland, County Tyrone. It has manufactures of linen and earthenware, and is in the centre of the Ulster coal-field. Pop. (1926) 3760.

Dungarpur, an Indian native state in Rajputana; area, 1000 sq. miles; pop. 153,381. Dungarpur is also the name of the chief town.

Dungarvan, a seaport, Irish Free State, County Waterford. It is a favourite watering-place, and the harbour, which accommodates vessels drawing 12 feet, is being improved. Pop. (1926) 5202.

Dung Beetle, a name applied to a large number of lamellicorn beetles from their habit of burying their eggs in dung. *Geotrypes stercorarius*, 'shard-borne' beetle, and *Scarabæus sacer* are examples.

Dungeness, a low headland in Kent, having a lighthouse with fixed light.

Dunkeld, a small town of Perthshire, Scotland, on the Tay; pop. 529. It is a very ancient place, and became the metropolitan see of Scotland in 850. The choir of the ancient cathedral is still used as the parish church.

Dunkirk, a fortified seaport, France, department of Nord, at the entrance of the Straits of Dover. It has manufactures

of earthenware, leather, soap, starch, ropes; sugar-refineries, breweries, and distilleries, and a large trade. It is one of the chief French torpedo stations, and is a great wool market. The harbour, which is very extensive and thoroughly up-to-date, can accommodate ships drawing up to 27 feet. Pop. 38,891.

Dunkirk, a port, New York State, U.S.A., on Lake Erie. It has a good harbour, a busy lake traffic, and is the headquarters of the Erie Railway Company. There are lumber-mills, iron-foundries, and machine-shops. Pop. 19,336.

Dunlin, a British bird (*Tringa alpina*), a species of sandpiper, occurring in vast flocks along sandy shores. It is about 8 inches in length from the point of the bill to the extremity of the tail, and its plumage undergoes marked variations in summer and winter. During the winter it migrates to a warmer climate.

Dunmow, Great and Little, two villages, England, county of Essex. The latter is remarkable for the ancient custom of giving a flitch of bacon to any couple who, a year and a day after their marriage, could swear that they had neither quarrelled nor repented.

Dunne, Finley Peter (1867–), American humorist. His works include: *Mr. Dooley in Peace and War* (1898), *Mr. Dooley's Philosophy* (1900), *Observations by Mr. Dooley* (1902), and *Mr. Dooley Says* (1910).

Dunnet Head, a bold rock promontory in Caithness, with sandstone cliffs 100 to 300 feet high, the most northerly point of the mainland of Scotland, crowned by a lighthouse visible at a distance of 25 miles.

Dunnottar Castle, an extensive ruin on the coast of Kincardineshire, Scotland, on a precipitous rock rising from the sea. It dates from the close of the fourteenth century, and was long the stronghold of the Keiths, earls marischal. During the Commonwealth this castle was selected for the preservation of the Scottish regalia; and in 1685 it was used as a State prison for Covenanters. It was dismantled in 1720.

Dunois, Jean, Count of Orleans and of Longueville (1402–1468), French hero, natural son of Louis, Duke of Orleans. He began his career with the defeat of Warwick and Suffolk, whom he pursued to Paris. By 1450 he had completely freed France from the English.

Dunoon, a burgh and watering-place of Scotland, in Argyllshire, on the shore of the Firth of Clyde. It consists of Hunter's Quay, Kirn, and Dunoon proper, each with its separate steamboat pier. On a green rocky knoll are remains of the castle of Dunoon. Pop. (1931), 8780.

Duns, John, commonly called *Duns Scotus* (1265 or 1274–1308), scholastic divine. In 1301 he was appointed divinity professor at Oxford. In 1304 he went to Paris, and was appointed professor and regent in the theological schools, in which situation he acquired the title of *Doctor Subtilis*, 'the subtle doctor'. He opposed Thomas Aquinas on the subject of grace and free-will; and hence the *Scotists* are opposed to the *Thomists*.—Cf. W. J. Townsend, *The Great Schoolmen*.

Duns, county town of Berwickshire, Scotland, on the Whitadder, has manufactures of linen, and paper-mills. Pop. (1931), 1788.

Dunsinane, a hill in Scotland, one of the Sidlaws, 1012 feet high, about 7 miles north-east of Perth, immortalized by Shakespeare in *Macbeth*.

Dunstable, a town, England, county of Bedford. It has a grammar school, and a parish church which is part of an ancient priory. Dunstable is famous for its manufactures of straw-plait. Pop. (1931), 8972.

Dunstan, St. (925–988), English archbishop and statesman. Edred made him his Prime Minister and principal director in civil and ecclesiastical affairs. In the reign of Edwy he was banished, but was recalled by Edgar and made Archbishop of Canterbury. He was again deprived of power on the accession of Ethelred in 978, and devoted the last years of his life to his diocese and literary and artistic pursuits.

Dupleix, Joseph (1697–1763), French leader in India. He accumulated a fortune by commercial operations in India, and in 1742 was appointed Governor of Pondicherry for the French East India Company. He was opposed by Clive, and a long string of British successes caused the complete overthrow of all his plans. Recalled in 1753, he died in want and obscurity in Paris.

Dupont, Pierre (1821–1870), French poet and song-writer. Some of his songs, such as *Song of Bread* and *Song of the Workers*, had a Socialistic ring which proved obnoxious to the Government.

His poems have been collected under the titles *Cahiers de Chansons*, *La Muse Populaire*, *Chants et Chansons*, *Poésie et Musique*, and *Études Littéraires*.

Dupont de Nemours, Pierre Samuel (1739–1817), French political economist. He early gained a reputation for his writings on commerce, and his exposition of the theories of the physiocrats. He was twice president of the National Assembly. Among his writings are: *Philosophie de l'Univers*, *Vie de Turgot*, and a translation of Ariosto.

Düppel, a fortified village in Schleswig-Holstein, on the coast of the Little Belt. The place is of considerable strategical importance, and having been held by Russia since 1864 was restored to Denmark by the plebiscite taken in 1920.

Dupuy, Charles Alexander (1851–1923), French statesman. He was Minister of Public Instruction in 1889, and succeeded Ribot as Premier in 1893, but resigned and became President of the Chamber of Deputies. He was again Premier from 1894 to 1895, and from 1898 to 1899, and was Minister of Labour from 1912 to 1914.

Dupuytren, Guillaume, Baron (1777–1835), French surgeon and anatomist. He was considered the first French surgeon of his day, made important discoveries in morbid anatomy, and invented several useful surgical instruments.

Duquesne, Abraham (1610–1688), French admiral. In 1647 he commanded the expedition against Naples. In the Sicilian War he thrice defeated the combined fleets of Holland and Spain under the renowned De Ruyter.

Durance, a river of France, which rises in the Cottian Alps, and, after a course of about 180 miles, joins the Rhone about 4 miles below Avignon. Marseille is supplied with water from the Durance.

Durango, a town in Mexico, capital of the state of Durango. It has a mint, and manufactures cotton and woollen goods and leather. Pop. 39,091.—The state (area, 42,272 sq. miles) has valuable gold-, silver-, and iron-mines, and also fertile tracts. Pop. (1921), 336,766.

Durazno, a department and town of Uruguay. The department has an area of 5525 sq. miles, and a pop. of 61,322.

Durazzo, a seaport of Albania, on the Adriatic. It is fortified, and its harbour, the best on the coast, is capable of improvement by artificial means. Indeed,

the making of a good harbour at Durazzo is almost essential to the development of Albania. Pop. 5000.

Durban, chief port of Natal, on a landlocked bay (Port Natal). It has many handsome buildings, and is connected by railway with Maritzburg and the interior. The harbour admits vessels of 20,000 tons reg., has a quay length of over 2 miles, and complete dry-dock and repair facilities. Pop. (1921), 146,310 (57,095 white); white pop. 1926, 70,883.

Düren, a town in the Rhine province, on the right bank of the Roer. It has important manufactures of woollens, paper, leather, rails, and hardware, and an extensive trade. Pop. 32,511.

Dürer, Albrecht (1471–1528), German painter, designer, sculptor, and engraver on wood and metal. In 1505 he went to Venice to improve himself in his art. He also travelled to Bologna to improve his knowledge of perspective. On his return to Nürnberg (his native town) his fame spread far and wide. Maximilian I appointed him his court-painter, and Charles V confirmed him in this office. Among his masterpieces in painting are a *Crucifixion*, *Adam and Eve*, an *Adoration of the Magi*, and portraits of Raphael, Erasmus, and Melanchthon, who were his friends. Among his best engravings on copper are his *Fortune*, *Adam and Eve in Paradise*, and *The Smaller Passion*, in sixteen plates. Among his best engravings on wood are *The Greater Passion* (so called), in thirteen plates; *The Smaller Passion*, with the frontispiece, thirty-seven pieces; and *The Life of Mary*, two prints, with the frontispiece.—BIBLIOGRAPHY: L. Cust, *Albrecht Dürer: a Study of his Life and Works*; F. Nüchter, *Life and Selection from Works*.

D'Urfey, Thomas (1653–1723), English song-writer and dramatist. His bombastic tragedy *The Siege of Memphis* appeared in 1676. D'Urfey's name is now principally remembered in connexion with his *Pills to Purge Melancholy*, a collection of songs and ballads, partly his own.

Durham, an ancient city of England, capital of the county of the same name, on the Wear. There is an ancient castle—now appropriated to the uses of the university—and a magnificent cathedral occupying a height overlooking the Wear. The educational institutions comprise the university, opened in 1833, the grammar-

school, and other schools. There are manufactures of carpeting and mustard, and in the neighbourhood are coal-mines. Pop. (1931), 16,223.

Durham, a town of North Carolina, U.S.A. It is a centre of the tobacco industry, and has foundries and cotton-mills. Pop. 21,719.

Durham, County of, a county on the north-east coast of England, having on the north Northumberland, from which it is divided by the Rivers Tyne and Derwent. Its area is 649,244 acres, of which two-thirds are under cultivation. The western portion of the county is hilly, enclosing fertile valleys, the eastern portion is more level, and the centre contains extensive coal-fields. Durham is the chief coal county in England, and also produces fire-clay. The chief crops are wheat, oats, turnips, and potatoes. In connexion with the commerce of the county may be noticed its foundries, iron-works, potteries, glass-houses, iron ship-building, engine- and machine-works, and chemical-works. The chief towns besides Durham are Sunderland, Gateshead, South Shields, Stockton, Darlington, and Hartlepool. Pop. (1931), 1,485,978.

Durham University was founded in 1832, opened in 1833, and incorporated by royal charter in 1837. It is connected with the bishopric of Durham, the office of warden being annexed to the deanery of Durham, and a canonry in the cathedral being annexed to each of the professors of divinity and classical literature. Armstrong College, founded in 1874, and the College of Medicine, both at Newcastle-on-Tyne, form part of the University of Durham. In 1922 there were 1250 students at the university.

Durlach, a town in Baden, at the foot of the Turmberg, with manufactures of machinery, chemicals, and leather. Pop. (1925), 18,016.

Durmast, a species of oak, *Quercus sessiliflora*, very like the common oak, with a darker, heavier wood not easily broken, and much valued for furniture-making.

Duroc, Michel Géraud Christophe, duc de Frioul (1772–1813), French general. He served as aide-de-camp to Napoleon in the Italian and Egyptian campaigns. He was a great favourite of Napoleon, and was killed by his side at Bautzen.

Durra, or **Dhurra**, Indian millet, the

seed of *Sorghum vulgare*, after wheat the chief cereal crop of the Mediterranean region, and largely used in those countries by the labouring classes for food. Varieties are grown in many parts of Africa, one of them being known as Kafir corn.

Duruy, Victor (1811–1894), French historian and educationist. He was Inspector-General of Secondary Education, and Minister of Public Instruction (1863–1869). He wrote numerous books on history and geography, the most important of which are *Histoire des Romains* and *Histoire de la Grèce Ancienne*.

Duse, Eleonora (1859–1924), Italian actress. Among her most remarkable impersonations were those of Francesca da Rimini, Marguerite Gautier in *La Dame aux Camélias*, Magda, La Tosca, Paula in *The Second Mrs. Tanqueray*, and Nora in Ibsen's *A Doll's House*. She appeared for the first time in London in 1897.

Düsseldorf, a town of Germany, in the Rhine province, on the right bank of the Rhine. It is a great focus of railway and steamboat communication, and has a number of handsome public buildings. The city abounds in art treasures. The industries embrace iron, machinery, railway plant, cotton, leather, chemicals, and beer, and the trade is large. Pop. 407,838.

Dust, solid matter in a fine state of division. Spores of plants, bacteria, &c., are found in the atmosphere, but in general organic particles are numerous only over thickly populated districts. Inorganic particles are derived from various sources. Where the soil is dry, dust is whirled aloft by the winds, this cause giving rise to the great sand-storms of tropical desert regions. Volcanoes in eruption eject large quantities of dust. It is estimated that millions of meteors are encountered by the earth per day. Most of these are excessively minute. They are speedily disintegrated, and generally entirely reduced to dust at high levels. Evaporation is almost always proceeding over seas and oceans, and from foam thrown up and swept along by the winds the dissolved salts are liberated as solid particles. Again, vast quantities of dust are produced in the consumption of fuel.

Dr. Aitken found the proportion of dust on Ben Nevis to vary at different times from under 100 particles to over 14,000 per cubic centimetre. Over oceans the numbers were from about 500 on the Indian to 2000 on the Atlantic. But over

cities 100,000 per cubic centimetre are frequently present. A puff of cigarette smoke was estimated to contain 4,000,000,000 particles.

Many phenomena are connected with the existence of dust in the atmosphere. Dust is the main cause of the scattering of the sun's rays which produces twilight, the blue of the sky, the gorgeous red and golden hues of sunrise and sunset, and the purple lights of advancing dusk.

Dutch Clover, *Trifolium repens*, commonly called white clover, a valuable pasture plant. It has a creeping stem; the leaflets are broad, obovate, with a horse-shoe mark in the centre; the white or pinkish flowers are in a globular head.

Dutch Colonies. See *Colony* and consult separate articles.

Dutch East Indies, a group of islands stretching eastwards from Malaya and forming an important Dutch colony. The colony includes Java and Madura, with the 'Outposts', which comprise Sumatra, the south-east and west portions of Borneo, Banca, Billiton, Celebes, the Timor and Riau-Lingga Archipelagos, the Lesser Sunda Islands, the Moluccas, and the north and west of New Guinea. The total area is 783,642 sq. miles; the population of 49,350,884 includes 46,000,000 natives of Malay race, 832,000 Arabs, Chinese, and other Orientals, and some 80,000 whites. The colony was founded by the Dutch East India Company, which established Batavia (1619) and settled Sumatra (1677). The Company was dissolved in 1798, and the islands came directly under the Netherlands Government. Java is by far the most important island, and Batavia on the north-west coast is the administrative capital of the group. Some of the outlying islands are governed by native rulers advised by Dutch commissioners. There is an enormous trade, principally in rice, tobacco, tea, coffee, sugar, tin, rubber, beans, and copra. Exports (1922) were £95,741,318; imports, £65,281,954. All religions are tolerated, and education is well developed. See articles *Borneo*; *Java*; *Sumatra*; *Sunda Is.*; &c.—Cf. J. M. Brown, *The Dutch East*.

Dutch Rush, *Equisetum hyemale*, one of the plants known as horse-tails, employed as a fine sand-paper. The plant is found in Britain, but for economic use is imported from Holland.

Dvina, Northern, a Russian river

which rises in the government of Vologda, and falls by four mouths into the White Sea near Archangel. It is navigable as far as Suchona, and is connected with the Volga and Neva by canal.

Dvina, Western, a Russian river, falling into the Gulf of Riga after a course of 650 miles. It is navigable for a considerable distance, but is frozen for four months each year.

Dvinsk, a fortified town in Latvia, on the Western Dvina. It has various industries, trades in grain, flax, and timber, and has three yearly fairs. Pop. 45,000.

Dvořák, Anton (1841–1904), Bohemian musical composer. He composed several operas on national Bohemian subjects, songs, orchestral arrangements of Bohemian dances, several symphonies, a *Stabat Mater*, a cantata (*The Spectre Bride*), and an oratorio (*St. Ludmila*).

Dvur Kralové (formerly *Königinhof*), a town of Bohemia, Czechoslovakia, on the Elbe. It is an important textile centre. Pop. c. 15,000.

Dwarf, a human being of small dimensions. Strictly speaking, the term should be used with reference to individuals and not to races, who should be called 'pygmies' (q.v.). Individual dwarfs occur in all races, and were formerly a fashionable appendage to the courts of princes and the families of nobles. Jeffery Hudson, the favourite dwarf of Charles I, at the age of thirty is said to have been only 18 inches high, though he afterwards grew to 3 feet 9 inches. Charles H. Stratton, 'General Tom Thumb', was 31 inches high at the age of twenty-five; Francis Flynn, 'General Mite', was only 21 inches at sixteen. In most of the extreme cases the dwarfing is the result of some defect in the ductless glands which regulate the normal growth of the body.

Dwight, Timothy (1752–1817), American divine. He was president of Yale College. His *Theology Explained and Defended* (1818) was for long a standard work.

Dyaks, the aborigines of Borneo, chiefly inhabiting the interior of the island. They are a finely formed race, and are described as docile, industrious, and superior to the Malays. Head-hunting has now almost died out, and, especially in Sarawak, the Dyaks have become very civilized.

Dyce, Alexander (1798–1869), Shakespearean editor. His edition of Shakespeare

in six volumes, with notes, appeared between 1853 and 1858.

Dyce, William (1806-1864), British painter. In 1840 he became director of the School of Design in London, and in 1844 was appointed professor of fine art in King's College, London. Amongst his chief works are: *Francesca da Rimini*, *Joash shooting the Arrow of Deliverance*, *King Lear in the Storm*, *Christabel*, and *The Good Shepherd*.

Dyeing is the art of colouring textile and other materials in such a way that the colours are not readily removed by the action of light, washing, &c. The natural dyes formerly employed are now largely displaced by dyes derived from coal-tar products, the first discovery of which was made by Perkin in 1856. The fundamental principle of dyeing is, that the colouring matter and other necessary substances must be applied in a state of solution, and while in direct contact with the fibre they must be rendered insoluble, so that they are precipitated within or upon the fibre and fixed permanently. According to the method of their application in dyeing, the following groups of dye-stuffs may be distinguished: *Acid Dyes*, *Basic Dyes*, *Direct Dyes*, *Developed Dyes*, *Mordant Dyes*, *Vat Dyes*. A dye is *substantive* to a particular fibre when it dyes that fibre directly, and *adjective* when the presence of a third substance known as a *mordant* is necessary.

The *acid dyes*, as a rule, are only suitable for dyeing the animal fibres, e.g. wool and silk, also leather, horn, feathers, &c., and they are substantive to these materials. The acid dyes derived from coal-tar are very numerous, and yield a great variety of hues.

The *basic dyes* are so called because their essential constituents, to which they owe their dyeing power, are organic bases. Wool, silk, and animal substances generally are readily dyed by simple immersion in hot aqueous solutions of the basic dyes. Cotton and linen need first to be mordanted or impregnated with the *mordant* tannic acid.

The *direct dyes* are so called because they dye cotton without the aid of any mordanting process. The first of this class derived from coal-tar was *congo red*, discovered in 1884; at present this group forms one of the most important and valuable series of dye-stuffs employed.

Cotton, linen, and the vegetable fibres generally are dyed in the simplest possible manner by merely boiling them in a solution of the dye-stuff. The coal-tar colours of this class are extremely numerous.

The *developed dyes* are formed *in situ* upon the fibre by the successive application of two or more substances.

The *mordant dyes* form one of the most important classes of colouring matters, for they include not only most of the vegetable dye-stuffs, e.g. madder, logwood, fustic, &c., but also many valuable fast coal-tar colours, commonly known as *alizarin dyes*, after their typical representative, alizarin. Applied in conjunction with metallic salts, notably those of chromium, aluminium, iron, tin, and copper, they each yield a variety of colours, according to the metallic salt employed. The vegetable dye-stuffs of this class include *Madder*, *Sapanwood*, *Camwood*, *Barwood*, *Old Fustic*, *Young Fustic*, *Quercitron Bark*, *Persian Berries*, *Weld*, *Logwood*. *Madder* was formerly the most important and highly valued of the dye-stuffs of this class, being especially employed to produce the fine 'Turkey-red' dye; but it is now entirely superseded by the coal-tar colour alizarin. Similarly, the employment of *cochineal* has also greatly diminished. *Quercitron bark* is an excellent dye-stuff employed by wool-dyers for the production of bright orange and yellow colours. *Logwood* is largely employed by wool, silk, and cotton dyers for dyeing black and dark-blues, which, although fast to washing, are only moderately so towards light. The important vegetable dye *catechu* is used in dyeing cotton and wool brown.

The *vat dyes* are insoluble in water, but yield reduction products which are soluble in aqueous alkali, and can be readily reoxidized to the dye-stuff. *Indigo*, a typical vat dye, is prepared both artificially and from natural sources. It is a dark-blue powder quite insoluble in water, but when reduced it yields *indigo-white* which dissolves in aqueous alkali, the solution thus obtained being called an *indigo-vat*. Cotton, wool, or silk steeped for some time in the clear yellow solution of such a vat, and then exposed to the oxidizing influence of the air, is dyed a permanent blue.

The *mineral colours* chrome yellow, iron

buff, Prussian blue, and manganese brown, employed in cotton dyeing, belong to the group of developed dyes. They are very useful for certain purposes, and are very fast to light.—BIBLIOGRAPHY: W. Crookes, *A Practical Handbook of Dyeing and Calico-printing*; W. P. Dreaper, *Chemistry and Physics of Dyeing*.

Dyer, Sir Edward (d. 1607), English poet. He was a friend of Sir Philip Sidney, and is remembered as the putative author of *My mind to me a kingdom is*.

Dyer, John (1700–1758), English poet. In 1727 he published his poem of *Grongar Hill*, and in 1757 *The Fleece*, a didactic poem in five books.

Dyer's-weed, a British plant of the same genus as *mignonette*, otherwise called *Yellow-weed* or *Wood*, nat. ord. *Resedaceae*. It grows in waste ground, and is cultivated for the yellow dye obtained from it.

Dynamics is the science which deals with the laws of force in their relation to matter at rest or in motion, and as such it is differentiated from *kinematics*, which considers motion mathematically, and apart from the forces producing it. Dynamics is divided into two great branches: *statics*, which treats of solid bodies at rest under the action of forces; and *kinetics*, which treats of the action of forces in producing motion in solid bodies. Formerly the latter alone was called dynamics, and to this, in conjunction with statics, the general name *mechanics* was given. It is to Newton that we owe the clear statement of the three primary laws of force on which the science of dynamics is based. These are: (1) that every body remains in a state of rest, or of uniform motion along a straight line, unless it is compelled by force to change that state; (2) that rate of change of momentum is in proportion to the force employed, and occurs along the straight line in which the force acts; (3) that, as the result of every action, there is always an equal and opposite reaction. We require to begin by establishing units of space, time, and mass. There are two systems of units in use, the one British, the other French. In the British system the foot is taken as the unit of length, and the second as the unit of time. In the French the centimetre is the unit of length, the second the unit of time. The British unit of mass is the pound (the mass of a certain lump of platinum deposited in the Exchequer

Office, London); the French the gramme; and accordingly the French units of space, mass, and time are commonly known as the C.G.S. (centimetre, gramme, second) units. As the weight of a pound (or a gramme) is not the same at all parts of the earth's surface, it cannot give us of itself an absolute unit of force. Two absolute units of force are in common use in dynamics, the *poundal* and the *dyne*; the latter being the absolute unit in the C.G.S. system. The former is *that force which, acting on the mass of one pound for one second, generates in that mass a velocity of one foot per second*. It is important in dynamics to distinguish between *mass* and *weight*. The *mass* of one pound is the quantity of matter equal to a certain standard quantity (a certain lump of metal), and is quite independent of force. The *weight* of one pound is the force with which the mass of one pound is attracted to the earth's surface by the force of gravity. Another important term is *momentum*: the momentum of a body in motion at any instant is the product of the mass of the body and the velocity at that instant. See *Elasticity*; *Energy*; *Force*; *Hydrodynamics*; *Kinematics*; *Kinetics*; *Statics*; *Thermodynamics*; *Waves*.—BIBLIOGRAPHY: Kelvin and Tait, *Natural Philosophy*; A. Gray, *Dynamics*; P. G. Tait, *Dynamics*; S. L. Loney, *Mechanics and Hydrostatics for Beginners*.

Dynamite. See *Explosives*.

Dynamo. See *Generator*.

Dynamometer, an apparatus for measuring the power or rate of working of a machine. There are two types, the transmission dynamometer and the absorption dynamometer. The instrument is generally employed to determine the horsepower transmitted by a shaft or by belting.

Dysart, a royal burgh of Scotland, in Fife, on the Firth of Forth. It has a large export trade in coal. The harbour is used by vessels up to 200 tons reg. Pop. 4598.

Dysentery is a disease of an acute type, due to the action of a bacillus, characterized by pain and frequent passage of blood and mucus, and very common in tropical countries. The bacilli are widely spread by the faeces of infected persons, and usually the infection takes place by the mouth. The onset is rapid, and marked

by fever, pain in the abdomen, and frequent stools. At first mucus only is seen in the stools, but soon blood appears. In very acute cases the patient is seriously ill in forty-eight hours, and may die on the third or fourth day. Moderate cases may go on for several weeks, with resulting convalescence. Some cases become chronic in type, and a person may have chronic dysentery for years. Bismuth in large doses is given, and morphia is a most useful drug to relieve the pain and quieten the bowel. Normal saline solution is given by rectum after the acute stage, whenever possible. Chronic dysentery requires dietetic treatment for the persistent dyspepsia and irritability of the bowel.

Dyson, Sir Frank Watson (1868—), British astronomer. He was appointed Astronomer Royal for Scotland in 1905, and Astronomer Royal for England in 1910.

Dyspepsia, or **Gastritis**, may be either acute or chronic. *Acute dyspepsia* may follow when more food is taken than the stomach can digest, or when unsuitable articles are taken. The symptoms are headache, depression, nausea, vomiting, with pain, varying from a feeling of discomfort in the abdomen to marked tenderness. The tongue is furred, and usually there is diarrhoea, while in the more severe attacks the onset is marked by chill and a rise of temperature. An attack may

last from one day to four days. Treatment for mild cases is simply a dose of castor-oil (children) or blue pill (adults). Absolute rest to the stomach is necessary, and only small quantities of water allowed. Repeated attacks lead to the establishment of the chronic form. *Chronic dyspepsia* is a condition of disturbed digestion due to the prolonged use of unsuitable, or improperly prepared, foods. It may also arise in the course of diseases like anæmia and chronic tuberculosis. Treatment consists of dietetic measures, regulated exercises, change of air and surroundings, and avoidance of depression. Milk should be used freely, and in severe cases should be given alone till improvement sets in. Fats and greasy dishes should be avoided. Drugs do not play so important a rôle, but bitter tonics, like *nux vomica*, *quassia*, *gentian*, &c., are the best. Constipation should be treated when necessary.

Dzeren, or **Dzeron**, the Chinese antelope, a remarkably swift species of antelope (*Procapra gutturōsa*) inhabiting the dry arid deserts of Central Asia.

Dziggetai, or **Kiang** (*Equus hemionus*), a species of wild ass native to Central Asia, allied both to the horse and ass. It runs with great rapidity.

Dzungaria, a Chinese territory in Central Asia, stretching from about 43° to 48° N. lat. and from about 82° to 86° E. long. It has an area of 147,950 sq. miles, and a pop. of 600,000.

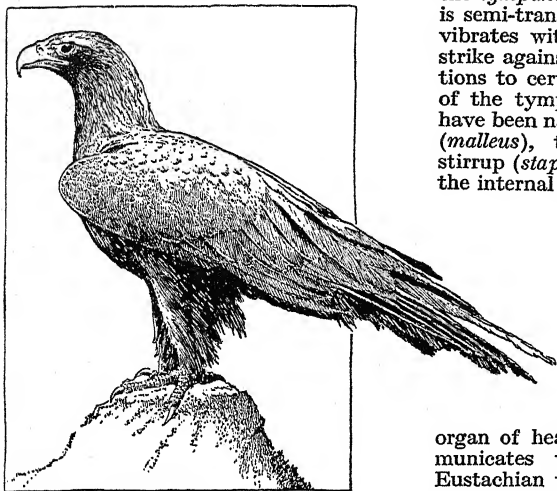
E

E, the second vowel and the fifth letter of the English alphabet. It occurs more frequently in English words than any other letter of the alphabet. Its long or natural sound in English coincides with the sound of *i* in the Italian and French languages, as in *here*, *mere*, *me*. It has also another principal sound, a short one, heard in *met*, *men*. It has besides a sound like *a* in *bare*, as in *there*, *where*, &c., and the obscure sound which is heard in *her*.

Eadmer (c. 1060—c. 1124), English monk. Besides the life of St. Anselm, Eadmer wrote lives of St. Wilfrid, St. Dunstan, St. Odo, and other English saints, as well as a valuable history (*Historiæ Novorum*) of events in England and the English Church from 1066 to 1122.

Eagle, the general name of raptorial birds that form a group or sub-family (Aquilinæ) of the great family Falconidæ, which includes the eagles, falcons, and hawks. The genus *Aquila*, which includes the most typical eagles, is distinguished by its long and powerful bill, the curve commencing at the cere, by its wings reaching to the tip of the tail, and by its tarsi being feathered to the toes. *A. chrysaetus*, the golden eagle, is the chief British species. It measures over 6 feet from tip to tip of the expanded wings, and 3 feet from the beak to the end of the tail. This species is found all over the northern hemisphere. Another British eagle is the erne or sea-eagle (*Haliaetus albicilla*) found near the sea-coast or lakes,

and feeding largely on fish. The general colour is greyish-brown, the head pale-coloured, the tail white. The bald eagle (*Haliaeetus leucocephalus*), found in North



Golden Eagle (*Aquila Chrysaetos*)

America and North-East Asia, is the symbol of the United States. Like all members of the genus, his diet is less restricted than that of the true eagles; and he even takes carrion.

Eagle, as a symbol. As the standard of the Roman armies it was first used by Marius, and afterwards took the place of all the other emblems at the head of the legions. In the Mediæval Ages the eagle became the heraldic emblem of the Holy Roman Empire, and was made double-headed in the fourteenth century. When the Holy Roman Empire fell to pieces in 1806, the double-headed eagle was retained by Austria.

Eaglehawk, a gold-mining town in Victoria, Australia, 4 miles from Bendigo. Pop. 8130.

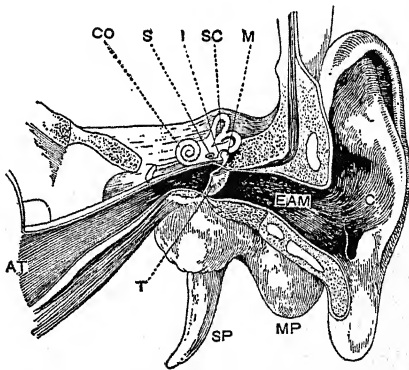
Eagle-owl, a name for several large horned owls, such as *Bubo ignavus*, found in many parts of Europe and sometimes in Britain.

Ealing, a borough of Middlesex, near London. Pop. (1931), 117,688.

Ear, the organ of hearing. The external ear, which is a cartilaginous funnel for

collecting the sound waves and directing them inwards, is composed of the *concha*, or projecting part, and of the *auditory canal*, which extends to the membrane of the *tympanum* or *drum*. This membrane is semi-transparent and very delicate. It vibrates with the waves of sound which strike against it, and transmits the vibrations to certain little bones of the cavity of the tympanum. These bones, which have been named respectively the hammer (*malleus*), the anvil (*incus*), and the stirrup (*stapes*), transmit the vibrations to the internal ear. The internal ear consists

of a complicated system of tubes known as the *membranous labyrinth*, containing fluid in which waves are set up by the vibrations transmitted to it by the little bones from the drum membrane. The lower part of the labyrinth is coiled like a snail shell, and is called the *cochlea*. It is the real organ of hearing. The middle ear communicates with the pharynx by the Eustachian tube, through which air from the mouth may be introduced into the tympanic cavity so as to permit vibrations of the drum membrane.—Cf. Sir



Diagrammatic section of the human ear. The bony labyrinth has been lifted out to show its relation to the three bones.

CO, Cochlea. S, Stapes. I, Incus. SC, Semicircular canals. M, Malleus. T, Tympanic Membrane. EAM, External Acoustic Meatus. C, Concha. AT, Auditory tube. SP, Styloid process. MP, Mastoid process.

Thomas Wrightson, *An Enquiry into the Analytical Mechanism of the Internal Ear*.

Earl, a degree of the British nobility between marquess and viscount, the title of highest antiquity in England. The earl was the highest rank of the nobility until Edward III created a duke in 1337, and Richard II a marquess in 1385. The premier earl of England is the Earl of Arundel, a title held by the Duke of Norfolk. See *Coronet*.

Earle, John (1601–1665), English bishop and writer. He published anonymously *Microcosmographie, or a Piece of the World discovered in Essays and Characters* (1628). In 1662 he was consecrated Bishop of Worcester, and next year was translated to Salisbury.

Earle, John (1824–1903), English philologist. He was professor of Anglo-Saxon at Oxford for many years. His publications include: *The Philology of the English Tongue*, *Anglo-Saxon Literature*, *English Prose: its Elements, History, and Usage*, and a translation of *Beowulf*.

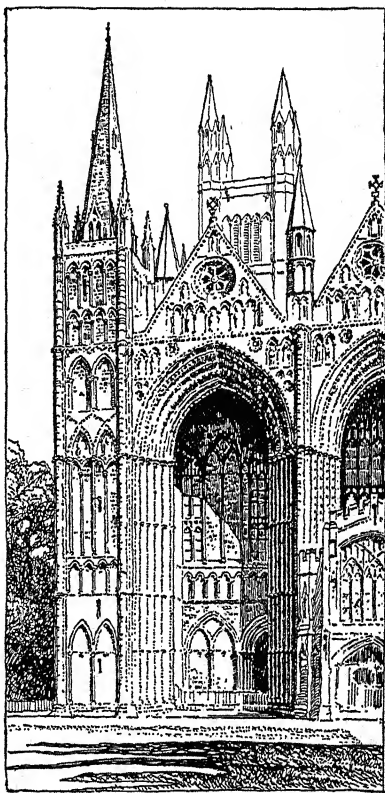
Earlestown, a town of Lancashire, England, 14 miles east of Liverpool. There are here engineering-works, sugar-works, and other establishments. Pop. 9020.

Earl-marshal, a great officer of England. He is the head of the College of Arms (Heralds' College), grants armorial bearings, and determines all claims in connexion with them. Since 1672 the office has been hereditary in the family of Howard (Dukes of Norfolk). There was also an earl-marshal of Scotland, the office being hereditary in the Keith family until 1716, when it was abolished.

Earlston, a village of Scotland, in Berwickshire. Near it are the ruins of the ancient tower which belonged to Thomas the Rhymer. Pop. (parish) (1931), 1689.

Early English Architecture, the first of the Pointed or Gothic styles of architecture that prevailed in England. It succeeded the Norman in the reign of Richard I (1189), and continued to the end of the reign of Henry II in 1272, a period of 123 years, when it gradually merged into the Decorated style. One of the leading peculiarities in this style is the form of the windows, which are narrow in proportion to their height, and terminate in a pointed arch, resembling the blade of a lancet (and therefore often called the *Lancet* style). The doorways are in general pointed, and in rich buildings

sometimes double; they are usually moulded, and enriched with the tooth-ornament. The buttresses are often very bold and prominent, and are frequently carried up to the top of the building with but little diminution, and terminate in acutely pointed pediments, which, when



Early English Architecture, Peterborough Cathedral. Part of West Front

raised above the parapet, produce in some degree the effect of pinnacles. In this style, likewise, flying-buttresses were first introduced. The earliest example of Early English architecture is the choir of Canterbury Cathedral, followed by the choir of Lincoln Cathedral, but some of the best examples are to be seen in Salisbury Cathedral.—Cf. F. Bond, *An Introduction to English*

Church Architecture from the 11th to the 16th Century.

Earn, a river and loch in the south of Perthshire, Scotland. Loch Earn is north of Ben Vorlich, is $6\frac{1}{2}$ miles long by $\frac{1}{2}$ to 1 mile broad, and is surrounded by rugged hills. The River Earn flows from the loch through Comrie, Crieff, and Perth, and falls into the estuary of the Tay. It is a fine salmon and trout stream.

Ear-ring. See *Jewellery*.

Earsdon, a town of England, South Northumberland, with productive collieries. Pop. (1931), 13,086.

Earth, the planet which we inhabit, a nearly spherical body which every twenty-four hours rotates from west to east round an imaginary line called its axis—this axis having as its extremities the north and south poles—while in the course of a year it completes a revolution round the sun. The earth is not an exact sphere, but is very slightly flattened at the poles, so as to have the form known as an *oblate spheroid*. In this way the *polar diameter*, or diameter from pole to pole, is shorter than the diameter at right angles to this—the *equatorial diameter*. The most accurate measurements make the polar diameter almost 27 miles less than the equatorial, the equatorial diameter being found to be 7926.7 miles, and the polar 7900 miles. The earth is regarded as divided into two halves—the northern and the southern hemispheres—by the *equator*, an imaginary line going right round it midway between the poles. (See *Latitude*; *Longitude*.) The earth, in common with the other planets, moves round the sun, completing its revolution in about 365 days and 6 hours. The orbit of the earth is an ellipse, with the sun in one of its foci. Hence the earth is not equally distant from the sun throughout the year; it is over 3,000,000 miles nearer at one time than another, its least distance (*perihelion* distance) being about 91,340,000 miles; its greatest (*aphelion* distance), 94,450,000 miles; and the mean distance, 92,897,000 miles. From this it may be calculated that the velocity of the earth in its orbit is about $18\frac{1}{2}$ miles a second. About 3rd Jan. the earth is nearest the sun, and about 4th July farthest from it. The passage of the earth round its orbit causes the sun to appear as if it described an annual circuit of the heavens; and hence it is that at one time

of the year one group of stars is seen in the neighbourhood of the sun near sunrise or sunset, and at another time another group. This apparent path of the sun is the *ecliptic*, and the groups of stars through which the sun successively passes form the *zodiac*. The earth's daily motion about its own axis takes place in twenty-three hours, fifty-six minutes, and four seconds of mean time, and is the occasion of the alternation of day and night. As the axis on which the earth performs its diurnal rotation is inclined towards the plane of its path about the sun at an angle of $66\frac{1}{2}^\circ$, and the angle between the plane of the ecliptic and the plane of the earth's equator is therefore $23\frac{1}{2}^\circ$, the sun ascends in the heavens, as seen from our northern latitudes, from 21st March to 21st June (the summer *solstice*), to about $23\frac{1}{2}^\circ$ above the celestial equator, and descends again towards the equator from 21st June to 23rd Sept.; it then sinks till 22nd Dec. (the winter *solstice*), when it is about $23\frac{1}{2}^\circ$ below the equator, and returns again to the equator by 21st March. This arrangement is the cause of the seasons, and the inequality of day and night attending them. For all places removed from the equator, day and night are equal only twice in the year (at the *equinoxes*). (See *Day*.) From the evidence furnished by volcanoes, hot springs, sinking of mines, &c., it is known that the earth has a high internal temperature. Taking the average of the various observed rates of increase, this temperature seems to increase 1° F. for every 60 feet of descent. The question of the constitution of its interior has in recent years been much investigated by means of seismographic records. These appear to indicate that there are three distinct divisions. The outer crust has a thickness of from 20 to 40 miles. It possesses a high power of resistance to all kinds of stress. Beneath it is a large shell possessing a density and elasticity resembling fine steel. This shell has a high rigidity against changing forces of shorter duration, like tidal action, but in its outer parts at least yields in time to unvarying long-continued stress. The third or innermost division of the earth is probably molten, as it can transmit compressional waves, but yielding immediately to distortional or twisting forces, is unable to transmit distortional waves. The earth (like the other planets) is

believed to have condensed and solidified from a gaseous or nebular condition, and to have once had a far higher temperature than now. (See *Nebular Hypothesis*.) Another feature that the earth as a whole presents is its magnetism. When a magnetic needle is balanced on a point, it remains at rest in one position only, pointing then nearly due north and south. This can be explained only on the supposition that the earth acts as a great magnet. It has, in fact, two poles—a north and a south magnetic pole—which are not very far from the geographical poles. The magnetic equator, where the vertical force is zero and the dipping needle takes a horizontal position, does not diverge greatly from the geographical equator. The earth acts upon all magnets as they act upon each other, and it is for this reason that they point north and south. (See *Terrestrial Magnetism*.) The surface of the earth contains over 196,000,000 sq. miles, of which about two-sevenths is dry land, the remaining five-sevenths being water. The land is arranged into masses of irregular shape and size, the greatest connected mass being in the eastern hemisphere. The population is between 1600 and 1700 millions. BIBLIOGRAPHY: E. Reclus, *The Earth and its Inhabitants*; T. G. Bonney, *The Story of our Planet*; H. Jeffreys, *The Earth, Its Origin, History, and Physical Constitution*.

Earth-houses, a name generally given throughout Scotland to underground buildings, also known as 'Picts' houses' or 'Picts' dwellings'. The earth-house in its simplest form consists of a single irregular-shaped chamber, formed of unhewn stones, the side walls gradually converging towards the top until they can be roofed by stones of 4 or 5 feet in width, all covered in by a mound of earth rising slightly above the level of the adjacent ground. In the more advanced form of these structures two or three chambers are found. Earth-houses are frequent in the north-east of Scotland, occasionally thirty or forty being found in the same locality. Querns, bones, deer's horns, earthen vessels, cups and implements of bone, stone celts, bronze swords, and the like, are occasionally found in connexion with them.

Earth-nut, the *Conopodium denudatum*, an umbelliferous plant common in woods and fields in Britain. It is brown, the size

of a chestnut, of a sweetish farinaceous nature, resembling in taste the common chestnut, and much eaten by pigs.

Earthquake, a shaking of the earth's surface, propagated from place to place by a wave motion. Earthquakes originate in the crust of the earth, generally at only a very few miles depth, and probably never lower than about 30 miles. The point of origin is called the centre or seismic focus, and the place on the surface vertically over it the epicentre. The focus of an earthquake is often submarine, and subsequent to the shock transmitted through the solid earth a great sea-wave may invade the land and produce far more disastrous effects. The vast majority of earthquakes are certainly *tectonic*, originating from the snapping of strata under great strain, or the further slipping of portions of the earth's crust along previously existing fault planes. A further cause is the contraction undergone by the earth in its secular cooling. There are also earthquakes of *volcanic* origin, accompanying eruptions, but these are not usually of any great violence, nor do they involve any large area. The coasts of the Pacific Ocean—American, Asiatic, and East Indian—are much visited by earthquakes, in especial the Japanese Islands. The other band of greatest frequency has a direction outlined by the Azores, Alps, Mediterranean, and the Caucasus and Himalaya Mountains. In recent years much information has been obtained by the investigation of earthquakes by various kinds of seismograph. One single instrument at a particular station will enable the distance of the epicentre to be calculated. From the results of three stations, the precise locality can practically always be told. The speed of the preliminary tremors is found to be only about 2 miles per second for very short distances, but for a quadrant of the earth's surface they travel at an average of about 7 miles per second, a speed which is only slightly exceeded for still greater distances. The second-phase waves travel with a little under two-thirds of these velocities. The first-phase waves are longitudinal, or waves of compression; the second-phase are transverse, or waves of distortion. The third-phase waves are of much longer vibration period and wide amplitude, and have been compared to a ground-swell on the sea. It is clear that

they travel on the surface, and not through the interior. Their speed is nearly 2 miles per second. The difference in time between the arrival of the preliminary tremors at any station and the arrival of the second-phase waves, or between the second-phase and third-phase waves, enables the distance of the epicentre to be easily found, as these differences, of course, become greater with increasing distance. Among the most remarkable earthquakes of modern times were those which destroyed Lima in 1746 and Lisbon in 1755; more recently destructive earthquakes visited Calabria in 1857, Peru and Ecuador in 1868, the Island of Ischia in 1884, Japan in 1896, North India and Calabria in 1905, San Francisco in 1906, Messina and Reggio in 1908, and the provinces of Kansu and Shensi in North-West China in 1920. Yokohama was completely and Tokio partially destroyed and 98,000 people killed by the Japanese earthquake in Sept., 1923. In Feb., 1931, an earthquake in the Hawke's Bay area of New Zealand devastated the towns of Hastings and Napier and did enormous damage. See *Seismograph*.—BIBLIOGRAPHY: J. Milne, *Earthquakes and other Earth-Movements*; C. Davison, *A Study of Recent Earthquakes*; C. G. Knott, *The Physics of Earthquake Phenomena*.

Earthworm, the name applied to segmented worms (Annelids) that burrow in the soil, and belong to the order Oligochaeta, a sub-division of the bristle-worms (Chætopoda). They have a long, cylindrical body, divided by transverse furrows into numerous rings. The commonest British forms are chiefly species of Lumbricus and Allolobophora. They feed on earth and various kinds of animal and vegetable matter, and they are of great service to the agriculturist by loosening the soil and increasing its depth.

Earwig (*Forficula*), a common orthopterous insect about three-quarters of an inch in length, having the wings folded under very short and truncate elytra or wing-cases, and the extremity of the abdomen armed with a horny forceps.

Easdale, a small island on the west coast of Scotland, 16 miles south-west of Oban, and adjoining Seil Island. It is $1\frac{1}{2}$ sq. miles in area, and contains great slate-quarries. There is a good pier, with a low-water depth alongside of 12 feet.

Easement, in law, a right or privilege

which one proprietor may have to use the land of another in connexion with the needs of his own land, as the use of a way, a watercourse, &c. The right to an easement may be acquired either by grant or by uninterrupted enjoyment for a period of years.

Eastbourne, a county borough and watering-place of England, Sussex, on the English Channel, near Beachy Head. The town is handsomely built, having fine parades and well-planted walks and drives. Pop. (1931), 57,435.

East Cape, the most easterly point of Asia, projecting into Behring Strait.

East Chicago, a city and port of Indiana, U.S.A. It is practically a part of Chicago, and has iron and steel manufactures. Pop. 35,967.

East Cleveland, a city, Ohio, U.S.A., 10 miles E.N.E. of Cleveland. Pop. 33,820.

Easter, the festival commemorating the resurrection of Christ. The English name comes from the Anglo-Saxon *Eostre*, a goddess of light or spring, whose festival was celebrated in April. There was long a dispute in the Christian Church as to the proper time for holding Easter. The controversy was decided by the Council of Nice (Nicæa) in 325, which settled that it was to be reckoned as at present, namely, that Easter is the first Sunday after the full moon which happens upon or next after the 21st of March; and if the full moon happens on a Sunday, Easter Day is the Sunday after. One of the most popular Easter customs is the giving of Easter eggs. The egg was an old symbol of the resurrection. Formerly eggs dyed in symbolic colours were commonly given, but now the eggs are often made of chocolate, &c.

Easter Island, or *Rapa Nui*, an island, 12 miles long, in the South Pacific Ocean, long. $109^{\circ} 17' W.$, lat. $27^{\circ} 6' S.$, and utilized for grazing sheep and cattle. It now belongs to Chile, from which it is 2000 miles distant. Pop. 250 in 1916. The Routledge Expedition reported, in 1919, that the inhabitants are of mixed Polynesian and Melanesian origin. Numerous gigantic stone images of a soft 'volcanic ash' were being worshipped when the island was first visited by Europeans in the eighteenth century. Some still lie partly constructed in a crater quarry. The present inhabitants are undoubtedly descendants of the image-makers and worshippers.—Cf. K. Routledge, *The Mystery of Easter Island*.

Eastern Rumelia. See *Rumelia, Eastern*.

East Griqualand. See *Griqualand East*.

East Ham, a borough of Essex, England, 6 miles east of London. It is an industrial centre containing large docks and factories. Pop. (1931), 142,460.

East India Company, a great English company, originally simply a trading association, which played an important part in the history of India. A charter was granted to it by Queen Elizabeth on 31st Dec., 1600, for fifteen years, renewable for a similar period. In 1609 the charter was renewed by James I, and made perpetual, reserving power to the Crown to recall it at three years' notice. A British naval victory over the Portuguese so impressed the Great Mogul that he made a treaty (1613) giving the English full liberty to trade in his dominions. In 1619 a treaty was made with the Dutch, by which the two Companies were to work in harmony for twenty years; but in 1623 the Dutch massacred the leading members of the English factory at Amboyna. At length, under Cromwell, the Company received a new charter. A territorial footing had been acquired in Madras in 1640, to which settlement was given the control of all the factories in Bengal and the Coromandel coast, the Supreme Council in India still remaining at Surat. A new charter, granted by Charles II in 1660, enlarged the powers of the Company, giving it political and judicial authority in the factories and colonies established by it, with the right to appoint governors. On the Revolution of 1688 the Company was involved in new difficulties. An Act of 1698 provided for the extinction of the old Company and the formation of a new one, but an amalgamation was eventually arranged in 1708. The dividends of the Company rose rapidly after the amalgamation, and finally settled at 8 per cent; and it procured without difficulty, at various periods, a prolongation of its exclusive privileges until 1780, still with three years' notice. In the meantime the French possessions had, as well as the English, been growing in power and importance in the East, and on the outbreak of the War of the Austrian Succession in 1741 commenced those struggles (Clive being the first great English leader) by which a mercantile company was led on to establish British supremacy over

nearly the whole of India. In 1766 the right of the Company to acquire territorial possessions formed a subject of parliamentary inquiry, and the ministry sent out a Crown plenipotentiary to India. A regulating Act was passed in 1773 remodelling the powers of the Company, and placing it completely under the control of Parliament. In 1784 another Act established a board, afterwards known as the Board of Control, to superintend, direct, and control all acts, operations, and concerns relating to the civil and military government or revenues of India. From this time the political power of the Company was little more than nominal. The renewal of the Company's charter in 1834 took place amid continued opposition to their mercantile, and even to their legislative privileges. It enacted that the Company should with all convenient speed close their commercial business, and make sale of all their property not retained for Government purposes; all their other property was to be held in trust for the Crown, which was to take over their debts and guarantee their dividend out of the revenues of India. On the outbreak of the Mutiny of 1857 it was felt indispensable to vest the government of India directly in the Crown, and this was accordingly done in 1858.—**BIBLIOGRAPHY:** J. Bruce, *Annals of the East India Company*; J. Macpherson, *The History and Management of the East India Company*.

Eastlake, Sir Charles Lock (1798–1865), English painter. In 1817 he visited Italy and Greece, and painted besides other pictures his *Pilgrims arriving in Sight of Rome*. In 1830 he was elected member of the Royal Academy, and in 1850 became its president. Among his pictures are: *Lord Byron's Dream* (in the Tate Gallery), *Christ blessing Little Children*, and *Christ lamenting over Jerusalem*.

East Liverpool, a city of Ohio, U.S.A., 44 miles from Pittsburg. It is the centre of the pottery manufacture of the country, and other industries are the making of bricks, steel, &c. Pop. 21,779.

East London, a seaport on the east coast of Cape Province, South Africa, at the mouth of the Buffalo River, now an important outlet for this region, connected by railway with Cape Town. There is dock and wharf accommodation for vessels up to 10,000 tons reg. Pop. (1921), 34,673 (20,374 white); white pop. 1926, 23,210.

East Lothian. See *Haddington*.

East Main, a river of Canada, flowing to James Bay, and forming the boundary between Quebec and Ungava.

Easton, a city of Pennsylvania, U.S.A., at the junction of the Delaware and Lehigh Rivers. It contains iron-foundries, tanneries, and breweries. Pop. 33,813.

East Prussia. See *Prussia, East*.

East River, a strait in New York State, separating New York from Brooklyn and connecting Long Island Sound with New York Bay.

East St. Louis. See *St. Louis, East*.

Eastwood, a town of England, in Notts, with coal-mines. Pop. (1931), 5360.

Eau Claire, a city of Wisconsin, U.S.A., at the junction of the Eau Claire and Chippewa Rivers, a great lumbering and paper-making centre. Pop. 20,906.

Eaux-bonnes, a watering-place, France, department of Basses-Pyrénées, about 25 miles south of Pau. The hot sulphur springs are said to have great efficacy in affections of the chest. Pop. 622. Near it is *Eaux Chaudes*, also with warm springs.

Ebal, a mountain of Western Palestine, about half-way between Jerusalem and Nazareth. At the east end of the valley are Jacob's Well and Joseph's Tomb.

Ebbw-vale (pron. *Ebboo*), a town of England, in Monmouthshire, with iron-works, steelworks, and collieries. Pop. (1931), 31,695.

Ebenaceæ, a natural order of gamopetalous Dicotyledons, consisting of trees and shrubs, of which the wood is very hard, and frequently of very dark colour in the centre, as ebony. The principal genus is *Diospyros*, which yields ebony and iron-wood.

Ebers, Georg Moritz (1837-1898), German Egyptologist and novelist. His most important works have been translated into English, such as *Egypt, Descriptive, Historical, and Picturesque*; and the novels *An Egyptian Princess*, *Uarda*, *Homo Sum*, *The Emperor*, and *The Sisters*, all dealing with old Egyptian life.

Eberswalde, a town in Prussia, in the province of Brandenburg, on the Finow Canal. It has a school of forestry and a piscicultural establishment. There are paper-mills, brickworks, and brass-foundries. Pop. 27,000.

VOL. II.

Ebert, Fritz (1871-1925), first President of the new German Republic, the son of a tailor. In 1892 he became editor of the *Bremer Bürgerzeitung*. In 1908 he was elected to the Reichstag, and in 1916 became president of the Socialist group of this Assembly. He succeeded Prince Max of Baden as Chancellor of the Empire in 1918. The office was suppressed a few days later, and Ebert became Provisional President of Germany. The National Assembly met at Weimar, and elected Ebert as first President of the Reich on 11th Feb., 1919.

Ebionites, a sect of the first century. Irenæus described them as Jewish Christians. They united the ceremonies of the Mosaic institution with the precepts of the gospel, and observed both the Jewish Sabbath and Christian Sunday.

Eboli, a city of Campania, Southern Italy. Pop. 12,741.

Ebony, a name applied to a heavy, hard, durable wood, and also to the plant *Diospyros* from which the wood is obtained. *D. ebenum* is the most valuable, and is found in Ceylon. Ebony is of many colours, but the best is black. It takes on a high polish, and is used extensively in cabinet-work and in the manufacture of instruments.

Ebro, one of the largest rivers in Spain, which has its source in the province of Santander, and which after a southeasterly course of about 500 miles enters the Mediterranean. Its navigation is much interrupted by rapids and shoals, to avoid which a canal about 100 miles long has been constructed. Saragossa is the principal town on the river.

Écarté, a card-game for two players, is played with thirty-two cards, the smaller ones, from two to six inclusive, not being used. The remaining cards rank as follows: king (highest), queen, knave, ace, ten, &c. Each player receives five cards, and the play and scoring are somewhat as in whist, except for the *discard*. Before play begins, the non-dealer may claim to discard (*écarter*) any of the cards in his hand, and to replace them by fresh ones from the pack. This claim the dealer may or may not allow. Should he allow it, he can himself discard as many cards as he pleases.—Cf. Cavendish, *The Laws of Écarté adopted by the Turf Club*.

Eccentric, a term in mechanics applied

to contrivances for converting circular into reciprocating (backwards and forwards) rectilinear motion, consisting of circular discs attached to a revolving shaft, not centrally, i.e. eccentrically.

Eccles, a borough of England, in Lancashire, near Manchester. The town, engaged in textile industries, is famous for its cakes. Pop. (1931), 44,415.

Ecclesiastes, the title by which the *Septuagint* translators rendered the Hebrew *Kohleleth* ('the gatherer of the people'), one of the canonical books of the Old Testament. The book consists of 12 chapters, being a series of discourses on the vanity of earthly things, and the tone, which is sceptical, is such as is found in Omar Khayyām.

Ecclesiastical Courts, courts in which the canon law is administered and which deal with ecclesiastical cases, affecting benefices and the like. In England they are the *Archdeacon's Court*, the *Consistory Courts*, the *Court of Arches*, the *Court of Peculiars*, the *Prerogative Courts of the two Archbishops*, the *Faculty Court*, and the *Privy Council*, which is the court of appeal. In Scotland the ecclesiastical courts are the *Kirk-session*, *Presbytery*, *Synod*, *General Assembly* (which is the supreme tribunal as regards doctrine and discipline), and the *Teind Court*.

Ecclesiasticus, a book placed by Protestants and Jews among the apocryphal scriptures. The author calls himself Jesus the son of Sirach. Originally written in Hebrew, it was translated into Greek by the author's grandson in the second century B.C. In 1896 fragments of four MSS. in the Hebrew original were discovered in the synagogue at Cairo. Another fragment was discovered in Palestine by Mrs. Agnes Lewis.

Echidna, a genus of Australian toothless mammals, in size and general appearance resembling a large hedgehog, excepting that the spines are longer and the muzzle is protracted and slender, with a small aperture at the extremity for the protraction of a long flexible tongue. The habits of the Echidna are nocturnal; it burrows, having short strong legs with five toes, and feeds on insects, which it catches by protruding its long sticky tongue. It is nearly allied to the Ornithorhynchus, and the two constitute the lowest sub-class of mammals, the Prototheria or Monotremata, which present

many reptilian characters. One species (*E. hystrix*), from its appearance, is popularly known as the *Porcupine ant-eater*.

Echinococcus, the very large compound cyst which forms the bladder-worm stage in the life-history of a small tapeworm (*Tænia echinococcus*) living in the intestine of the dog.

Echinodermata, a phylum or subkingdom of invertebrate animals characterized by having a tough integument in which lime is deposited in scattered plates (sea-cucumber), flexibly articulated plates (star-fishes), or so as to form a rigid test or shell like that of the sea-urchin; and by the radial arrangement of many of the parts of the adult. The phylum is divided into nine classes: Asteroidea (star-fishes); Ophiuroidea (brittle-stars), Echinoidea (sea-urchins), Holothuroidea (sea-cucumbers), Crinoidea (sea-lilies, feather-stars, the latter free-moving), Thecoidea or Edrioasteroidea (extinct, stalkless but fixed), Carpoidea (extinct, stalked), Cystoidea (extinct, stalked), Blastoidea (extinct, stalked). All are marine.

Echinus, Sea-urchin, or Sea-egg, a genus of marine animals, the type of an order (Echinoidea) of the phylum Echinodermata. Locomotion is effected by meridional rows of tube-feet, aided by spines. *E. esculentus* and some other species are edible. See *Sea-urchin*.

Echo, the repetition of a sound caused by the reflection of sound-waves from some surface, such as the wall of a building. The echo may, however, be very distinct when the reflecting surface is very irregular, and it is probable that the resonance of the obstacles and the masses of air which they enclose contribute in producing the echo. The waves of sound on meeting the surface are turned back in their course according to the same laws that hold for reflection of light. Woods, rocks, and mountains produce natural echoes in every variety, for which particular localities have become famous.

Echo, in Greek mythology, a mountain nymph. Hera deprived her of speech, unless first spoken to. She subsequently fell in love with Narcissus, and pined away until nothing was left but her voice.

Echuca, an Australian town, state of Victoria, on the Murray, over which is

an iron railway and roadway bridge connecting it with Moama in New South Wales; trade (partly by the river) in timber and wool. There are great irrigation works. Pop. 4137.

Écija, a town of Southern Spain, province of Seville, with manufactures of textile fabrics and a good trade. It is one of the hottest places in Spain. Pop. about 30,000.

Eck, Johann Maier von (1486-1543), German theologian, the opponent of Luther. He went to Rome in 1520, and returned with a Papal Bull against Luther, in attempting to publish which he met with violent popular opposition. Eck was present also at the Diets of Worms (1540) and Ratisbon (1541).

Eckermann, Johann Peter (1792-1854), German writer. He was private secretary to Goethe, after whose death he published his *Conversations with Goethe*.

Eclectics is a name given to all those philosophers who do not follow one system entirely, but select what they think the best parts of all systems. Cicero in ancient and Victor Cousin in modern philosophy were eclectics.

Eclipse, an interception of the light of the sun, moon, or other heavenly body by the intervention of another and non-luminous body. A star or planet may be hidden by the moon; in this case the phenomenon is called an occultation.

An *Eclipse of the Moon* is caused by an interposition of the earth between the sun and the moon; consequently, all eclipses of the moon happen at full moon. The theory of lunar eclipses will be understood from fig. 1, where *s* represents the sun, *e* the earth, and *m* the moon. If the sun were a point of light, there would be a sharp outlined shadow or *umbra* only, but since the luminous surface is so large there is always a region in which the light of the sun is only partially cut off by the earth, which region is known as the *penumbra* (*P P*).

An *Eclipse of the Sun* is occasioned by an interposition of the moon between the earth and the sun; thus all eclipses of the sun happen at the time of new moon. Fig. 2 is a diagram showing a solar eclipse. It is evident that if a spectator be situated on that part of the earth where the umbra falls, there will be a total eclipse of the sun at that place; in the penumbra there will be a partial eclipse, and beyond the penumbra there will be no eclipse. An eclipse cannot be total longer than 7 minutes 58 seconds. The longest possible entire duration of an eclipse of the sun is a little over 4 hours.

An eclipse of the sun begins on the

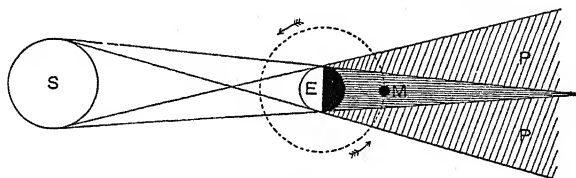


Fig. 1

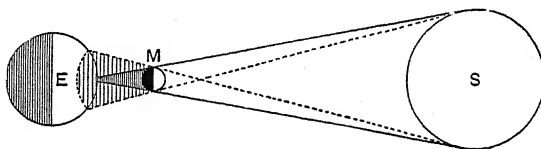


Fig. 2

Diagrams illustrating the Theory of Eclipses

western side of his disc and ends on the eastern; and an eclipse of the moon begins on the eastern side of her disc and ends on the western. The largest possible number of eclipses in a year is seven, four of the sun and three of the moon, or five of the sun and two of the moon. —BIBLIOGRAPHY: R. Buchanan, *The Theory of Eclipses*; W. T. Lynn, *Remarkable Eclipses*.

Ecliptic, the sun's path, the great circle of the celestial sphere, in which the sun appears to describe his annual course from west to east. The Greeks observed that eclipses of the sun and moon took place near this circle; whence they called it the *ecliptic*. The ecliptic has been divided into twelve equal parts, occupied by the twelve celestial signs, viz.:

♈ Aries (the Ram), 21st March.
 ♉ Taurus (the Bull), 20th April.
 ♊ Gemini (the Twins), 21st May.
 ♋ Cancer (the Crab), 21st June.
 ♌ Leo (the Lion), 23rd July.
 ♍ Virgo (the Virgin), 23rd Aug.
 ♎ Libra (the Balance), 23rd Sept.
 ♏ Scorpio (the Scorpion), 23rd Oct.
 ♐ Sagittarius (the Archer), 22nd Nov.
 ♑ Capricornus (the Goat), 22nd Dec.
 ♒ Aquarius (the Water-carrier), 20th Jan.
 ♒ Pisces (the Fishes), 19th Feb.

These are also called signs of the *zodiac*, the *zodiac* being a belt of the heavens extending 9° on each side of the ecliptic. The days of the month annexed show when the sun, in its annual revolution, enters each of the signs of the *zodiac*. The signs of the *zodiac* do not now coincide, as they did some 2000 years ago, with the constellations of the same names, and the First Point of Aries (one of the points where the celestial equator cuts the ecliptic) has now regressed through the greater part of the constellation Pisces. See *Precession* and *Nutation*; also Map at *Constellation*.

Eclogue, a term usually applied to what Theocritus called *idylls*—short, highly finished poems, principally of a descriptive or pastoral kind. See *Pastoral*.

École des Beaux Arts, the French Government school of fine arts at Paris, founded by Mazarin in 1648. The competitions for the *grands prix de Rome* take place at this school. The successful competitors receive an annual allowance from the State for three or four years, two of which must be passed at Rome.

École Normale Supérieure, a school at Paris for the training of those teachers who have the charge of the secondary education in France, founded by decree of the Convention in 1794. By the decree of 1903 the school forms part of the University of Paris.

École Polytechnique, a school in Paris established with the purpose of giving instruction in matters connected with the various branches of the public service, such as mines, roads and bridges, engineering, the army and the navy, and Government manufactures. It was founded in 1794, and is under the direction of the Minister of War.

Economics is the name applied to the scientific study of men in relation to the

production, exchange, distribution, and consumption of wealth.

The treatment of economics as a science had its origin in the writings of the Physiocrats, a group of French philosophers of whom Quesnay (1694–1774) was the most prominent, and with whom Turgot (1727–1781), the great minister of Louis XVI, held many doctrines in common. The Physiocrats argued that the wealth of the community was raised to the maximum, not by State regulation, but by entire freedom in the economic sphere. But the chief importance of the Physiocrats lay in their paving the way for Adam Smith (1723–1790), who in 1776 published *The Wealth of Nations*, in which the doctrine of non-interference by the State, commonly known as *laissez-faire* (q.v.), is laid down as absolutely necessary to a successful State. Yet he still definitely retained the conception of economics as part of the art of government. Thus, mainly through Adam Smith's influence, economics came to mean simply the study of what are in fact men's activities in relation to wealth. This conception is clearly expressed in such writers as Ricardo (1772–1823), whose *Principles of Political Economy and Taxation* enunciates the theory of rent which has formed the basis of all subsequent reasoning on the subject, and states a theory of wages which gave colour to Karl Marx's doctrine of the exploitation of wage-earners by capitalists. It is also evident in the work of Nassau Senior (1790–1864), in the important *Principles of Political Economy* of John Stuart Mill (1806–1873), and is most fully expressed by J. E. Cairnes (1823–1875).

This conception has formed the basis of all modern economics, despite important differences in the method of treating material. The modern point of view is stated in Dr. Alfred Marshall's *Principles of Economics*, in which he defines economics as "a study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment and with the rise of material requisites of well-being". The science deals only with what is, and not with what ought to be done; and is therefore distinct from *Ethics*. Interest in the application of ethical considerations to economic problems has increased considerably. Though psychological considerations must be taken into

account in the study of economics, the science is distinct from *psychology*. The traditional arrangement of the subject matter of economics into the production, exchange, and distribution of wealth is still maintained; but in recent years consumption, the end of almost all man's productive activity, has received much attention, notably from W. S. Jevons (1835-1882) and Marshall. Important conceptions in this connexion are those of the *diminishing utility* to an individual or group of individuals of each successive increment of any commodity received beyond a certain point; and of *consumer's surplus*, measured by the difference between the price a person pays for a thing and what he would pay rather than go without it. Any rigid distinction between the different branches of economics is, however, impossible. For example, all processes of exchange may be considered as part either of distribution or of production.

The central problem of economics is really that of how the exchange value of commodities and services is determined; since in this determination all the forces regulating production, distribution, and consumption are brought to a focus, and their action and interaction can be investigated. The study of value covers that of all forces affecting either the demand for or the supply of a commodity, including its cost of production. On the side of production, technical processes are not studied in detail, though some knowledge of them is indispensable; but matters common to all production are dealt with, such as the so-called *laws of increasing and diminishing return*, which are statements of the relation between the amounts of labour, land, and capital used in production, and the amount of product. Other questions considered are transport, markets of all kinds, banking, currency, finance, and trusts and combinations. The study of distribution includes the methods by which wages, interest and profits, and rent are determined; and since each of these is payment for a service (of labour, capital, and land respectively) it is really an aspect of the study of value. Distribution also covers such subjects as trade unionism, co-operation, and labour disputes. Economics also deals with public finance (including taxation), treating of the effects of different methods of collecting and expending the State revenue.

The method of economics is strictly that of a science, in that it aims partly at a descriptive analysis of material, and partly at a statement of cause and effect. The laws of economics are, like other scientific laws, statements of tendencies. The older writers on economics were mainly deductive in method, i.e. they took a few general principles, such as that every man follows his own interest and knows where that interest lies, and made certain assumptions, such as the existence of free competition; and on this basis worked out a group of principles which were sometimes quite unrelated to actual facts. Though this method was undoubtedly of great value, it fell short by ignoring certain aspects, and thereby obtained results the unreality of which produced a reaction. Malthus's *Essay on the Principle of Population*, published in 1798, was an early example of this. This book inaugurated the rise of a school of economists who treated their subject from an inductive and historical point of view. The historians, who have been especially prominent in Germany, and of whom representatives are Roscher (1817-1894), de Laveleye (1822-1892), and Cliffe Leslie (1825-1882), hold that economics should in the main be descriptive, and not attempt to formulate laws. The inductive school, of whom J. S. Mill is an important member, base their work upon more extensive investigation than the older writers, and constantly test their conclusions by reference to facts. Another important reaction against the early economists arose from the identification of the latter with the doctrine of *laissez-faire*. Alexander Hamilton (1757-1804) and Friedrich List (1789-1846) argued in favour of an extension of State activity, especially for the purpose of protecting industry against foreign competition, and may be considered the fathers of modern protectionist doctrine. In most modern treatments of economics, the deductive and inductive methods are employed side by side. Important recent developments in method are the increased use of statistics, made possible by their more widespread and careful compilation, and the application of mathematical methods to economic data. It is recognized that, with due care, many conceptions which are with difficulty expressed in words can be treated on mathematical lines to yield results of

great service. In this work the researches of Italian writers, such as Pantaleoni and Pareto, are of conspicuous importance.—

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Ectocarpaceæ, a family of Brown Algæ, section Phæosporeæ. The typical genus is Ectocarpus, comprising small, branched, filamentous marine plants.

Ecuador, a South American republic, triangular in shape, and wedged between Colombia, Peru, and the Pacific Ocean. Though the boundaries with Peru were demarcated in 1904, and with Colombia in 1916, disputes are still common. Taking these limits, however, the area of the 17 provinces is 220,508 sq. miles, and the population 1,328,421. The territory of Colon (Galapagos Islands) has an additional area of 2868 sq. miles; pop. c. 400. The capital is Quito, the seaports are Guayaquil and Esmeraldas, and other important towns are Cuenca and Riobamba. Ecuador falls into three sections, the narrow, low-lying coastal region, the mountain region, and the eastern plains. The mountain region belongs to the Andes system, and consists of a double range enclosing a long valley 20 to 40 miles broad and 8000 to 13,000 feet high. The ranges have, in many places, perpetual snow, and contain many volcanoes. The principal peak in the western chain is Chimborazo (20,703 feet), and in the eastern, Cotopaxi (19,500 feet). Most of the cultivated land is in this elevated plain. The chief rivers are the Tigre, Napo, Pastaza, &c., belonging to the Amazon basin, and most of them navigable. There are no rivers of consequence flowing to the Pacific. Vast areas in Ecuador are covered with forests, which yield cinchona bark, caoutchouc, sarsaparilla, and ivory nuts. On the coastal plains the climate is hot and unhealthy, and cocoa, cotton, sugar, and coffee are grown. In the central plain and in the mountain valleys the climate is temperate, cattle-rearing is carried on, and hay, grain, and fruits are grown. The chief industrial establishments are panama-hat factories (in Cuenca and Monticristi), flour-mills, sugar-refineries, and chocolate-factories. The rubber output is declining, and the future of the country

depends on the development of its forest resources and of fruit-growing for export. Mineral wealth is considerable but unexploited, and there are rich deposits of silver ore, coal, copper, and iron. Two oil-fields are worked by British companies (annual output about 40,000 barrels). Sulphur is found around Chimborazo and in the Galapagos. The value of exports in 1928 was £3,830,089, the principal commodities being cocoa, petroleum, rice, panama hats, ivory-nuts, and coffee. Imports were valued at £3,319,672. Exports from Britain to Ecuador in 1929 were £580,000. The present Constitution was promulgated in 1906. There is a President, a Senate, and a House of Deputies. There is no State religion, there being complete freedom of worship; primary education is free and compulsory, and there are universities at Quito, Guayaquil, and Cuenca. Military service is compulsory, and aviation is being advanced. The length of railway track is 698 miles, 280 of which represent the line from Quito to Guayaquil. Roads are bad, and river transport is greatly used in the centre and west. The monetary standard is the gold *condor* (of 10 *suces*), rate of exchange being fixed in 1927 at 5 *suces* = 1 U.S. dollar. The bulk of the population is Indian, and there are about 400,000 of mixed breed.—Cf. C. R. Enock, *Ecuador*.

Eczema is a skin eruption marked by the appearance of papules or vesicles and accompanied by irritation of the affected part, frequently very severe. There is difference of opinion among dermatologists as to whether or not it is primarily caused by germs. Various predisposing causes, like digestive disturbances, anæmia, and nervous disorders are important factors in determining the course of the disease.

Edam, a town of North Holland, near the Zuider Zee, noted for its cheese markets; though 'Edam cheese' is mostly made elsewhere. Pop. 6623.

Edda, the name given to two ancient collections of Icelandic literature. The first of these collections, called the *Elder* or *Poetic Edda*, was compiled in the thirteenth century, and discovered in 1643 by Brynjulf Sveinsson, an Icelandic bishop. It consists of thirty-three pieces, written in alliterative verse. The *Prose Edda*, or *Younger Edda*, presents a kind of prose synopsis of the Northern mythology; a

treatise on the Scaldic poetry and versification, with rules and examples; and lastly a poem (with a commentary) in honour of Haco of Norway (died 1263). In its earliest forms this collection is ascribed to Snorri Sturluson (1178-1241).

Eddy, Mary Baker (1821-1910), founder of Christian Science (q.v.). She began to teach her system of psychotherapeutics in 1866, and founded the first Christian Science Church in Boston in 1879. Her works, besides *Science and Health with Key to the Scriptures*, include *Unity of God* and *Christian Science versus Pantheism*.

Eddystone Lighthouse, a lighthouse in the English Channel, erected to mark a group of rocks lying in the fair-way from the Start to the Lizard. The rocks are covered only at the flood. The first lighthouse (1696-1703) was built by Henry Winstanley. The second (1709-1755) was built by Rudyerd. The third (1757) was built by Smeaton, but, as the foundations on which it stood became much weakened, a new structure, designed by Sir J. N. Douglass, was built between 1879 and 1882 on the neighbouring reef. Its light is visible 17½ miles.

Ede, a town, Holland, 12 miles north-west of Arnhem. Pop. 24,214.

Edelweiss, *Leontopodium alpinum*, a composite plant inhabiting the Alps, and often growing in the most inaccessible places. Its flower-heads are surrounded by a spreading foliaceous woolly involucre, and its foliage is also of the same woolly character.

Eden, a river in England, in Westmorland and Cumberland, falling into the Solway Firth after a course of 65 miles.

Eudentata, or Toothless Animals, the name applied to a primitive order of mammals mostly native to the neotropical region, but also represented in South Africa and South Asia. The body is often covered by horny scales or bony plates, the digits are clawed, and the teeth either imperfect or absent altogether. The New World forms include ant-eaters, sloths, armadillos, and certain extinct types, such as megatherium, mylodon, glossodon, and glyptodon. The Old World forms are the aard-vark and the scaly ant-eater.

Edessa, an important city in the north of Mesopotamia, which, subsequent to the establishment of Christianity, became celebrated for its theological schools. It is the modern Urfa.

Edfu, a town in Upper Egypt, province of Aswan, on the left bank of the Nile, with manufactures of cottons and pottery. There are the remains of a splendid temple. Pop. estimated at 20,000.

Edgar (*the Peaceful*), King of England. He came to the throne in 959, and, aided by Dunstan (q.v.), proved himself an able ruler. He died in 975, and was succeeded by his son Edward the Martyr.

Edgar Atheling (c. 1050 - c. 1130), grandson of Edmund Ironside and son of Edward the Outlaw. After the battle of Hastings, Edgar was proclaimed King of England by the Saxons, but made peace with William and accepted the earldom of Oxford. In 1097, with the sanction of William Rufus, he undertook an expedition to Scotland for the purpose of displacing the usurper Donald Bane, in favour of his nephew Edgar, son of his sister Margaret and Malcolm Canmore, and in this object he succeeded.

Edgeworth, Maria (1767-1849), Irish novelist. Her first novel, *Castle Rackrent*, a tale of Irish life, published in 1800, immediately established her reputation. Her later works include: *Belinda*, *Moral Tales*, *Leonora*, *Popular Tales*, *Tales of Fashionable Life*, *Patronage*, *Harrington*, *Ormond*, and *Helen*, besides an *Essay on Irish Bulls*.

Edinburgh, the metropolis of Scotland, lies within 2 miles of the south shore of the Firth of Forth. It is picturesquely situated, being built on three eminences which run in a direction from east to west, and surrounded on all sides by lofty hills except on the north, where the ground slopes gently towards the Firth of Forth. The central ridge, which constituted the site of the ancient city, is terminated by the castle on the west, situated on a high rock, and by Holyrood House on the east, not far from which rise the lofty elevations of Salisbury Crags, Arthur's Seat (822 feet high), and the Calton Hill overlooking the city. The New Town is situated on the rising ground beyond. The principal streets of the New Town are Princes Street (one of the finest streets in Europe), George Street, and Queen Street. The principal street of the Old Town is that which bears at different points the names of Canongate, High Street, Lawnmarket, and Castle Hill. It rises from a small plain at the east end of the town, on which stands the palace of Holyrood, and

terminates in the huge rock on which the castle is built. Amongst the notable buildings are the ancient Parliament House, since the Union the seat of the supreme courts of Scotland; St. Giles' Cathedral; the Tron Church; Victoria Hall (where the General Assembly of the Established Church meets); and John Knox's House. This part of the city is remarkable for its narrow lanes (*closes*) and carriage-ways (*wynds*). In the Old Town the most remarkable public building is the castle, of which the oldest portion is St. Margaret's Chapel; in an adjoining apartment are kept the ancient regalia of Scotland. The Scottish National War Memorial (opened 1927) is in the castle. An old piece of ordnance built of staves of malleable iron, cask fashion, and known as *Mons Meg*, stands conspicuous in an open area. No part of the palace of Holyrood House is older than the time of James V, and the greater portion of it dates only from the time of Charles II. On the south side of the Old Town stands the remaining portion of the city. Besides the buildings already noticed, Edinburgh possesses a large number of important edifices and institutions, chief amongst which are the Royal Institution (accommodating the Royal Society and other bodies), the National (Picture) Gallery, the National Portrait Gallery, the Museum of Science and Art, the Episcopal Cathedral of St. Mary's, and the university buildings. Amongst the prominent educational institutions are the university, the Royal High School, the academy, the United Free Church College, the Edinburgh School of Medicine, Medical College for Women, College of Agriculture, the Edinburgh Veterinary College, Fettes College, and the Heriot-Watt College. The National Library, formerly the Advocates' Library, contains upwards of 700,000 printed volumes and 3000 MSS. Printing, book-binding, coach-building, type-founding, machine-making, the making of rubber goods, furniture-making, ale-brewing on a very large scale, and distilling are the principal industries. Edinburgh is the head-quarters of the book trade in Scotland, and the seat of the chief Government departments. It is a great resort of tourists and other travellers. The town was made a royal burgh in the time of David I; but it was not till the fifteenth century that it became the recognized

capital of Scotland. Within the municipal boundaries are Portobello, Granton, Liberton, Duddingston, and Leith. Pop. (1931), 438,998.—BIBLIOGRAPHY: J. B. Gillies, *Edinburgh, Past and Present*; M. O. Oliphant, *Royal Edinburgh, Her Saints, Kings, Prophets, and Poets*; W. H. O. Smeaton, *Edinburgh and its Story*; H. E. Maxwell, *Edinburgh: a Historical Study*.

Edinburgh, County of, or Midlothian, is bounded by the Firth of Forth and by the counties of Linlithgow, Haddington, Berwick, Lanark, Peebles, Selkirk, and Roxburgh; area, 234,926 acres, over half of which is arable or under permanent pasture. The south-south-east and south-west parts of the county are diversified with hills, of which the two principal ranges are the Pentlands and Moorfoots. The principal rivers are the North and South Esks and the Water of Leith, all running into the Forth. The lowlands towards the Forth are the most fertile, and the hilly parts are chiefly under pasture and dairy farming. The chief crops are oats, barley, turnips, and potatoes. The manufactures are comparatively limited, but include ale, whisky, gunpowder, paper, and tiles. The fisheries are valuable. The chief towns are Edinburgh, Dalkeith, and Musselburgh. Pop. 506,378.

Edinburgh University, the latest of the Scottish universities, was founded in 1582 by a charter granted by James VI. The number of professors and other teachers is now over 240. The university is a corporation consisting of a chancellor, rector, principal, professors, registered graduates and alumni, and matriculated students. Its government is administered by the University Court, the Senatus Academicus, and the General Council, as in the other Scottish universities, in all of which new ordinances have been introduced under the Universities (Scotland) Act of 1889. The number of students in 1929-1930 was 4440. Candidates for degrees in the different faculties must now pass an entrance examination before attendance upon classes. Women are admitted to all courses and degrees equally with men, except in the faculty of divinity. The usual degrees are conferred, as well as those of Bachelor and Doctor of Music. There is a joint board of examiners for the four Scottish universities, having the control and supervision of the pre-

liminary examinations. The university has splendid laboratories and museums. The foundation stone of a new science laboratory was laid by King George on 6th July, 1920. The library contains 300,000 volumes. There are bursaries, scholarships, and fellowships, amounting annually to about £12,500. Since 1918 the University of Edinburgh unites with the other Scottish universities in returning three members to Parliament. The constituency consists of the General Council.—Cf. Sir Alex. Grant, *The Story of the University of Edinburgh from Early Times to 1908*.

Edison, Thomas Alva (1847–1931), American inventor. Amongst his numerous inventions are the quadruplex and sextuplex telegraph, the carbon telephone transmitter, the 'Edison system' of lighting, the electric fire-alarm, the 'Edison electric railway', the phonograph, and the megaphone. His improvements in the cinematograph made it practicable, though he did not originate the idea of it.

Edmonton, an urban district in England, Middlesex, with an extensive trade in timber, carried on by the Lea River navigation. Pop. (1931), 77,652.

Edmonton, a town, Canada, capital of Alberta, on the North Saskatchewan (here navigable). It is an important station on the Canadian National and the Canadian Pacific Railways, and is a busy industrial place. It is an agricultural and fur-trade centre, and has meat-packing plants, sawmills, and coal-mines. It is the main outlet for the Peace River district. Pop. 58,821.

Edmund I, King of England, succeeded his brother Athelstan in 940. He conquered Cumbria, which he bestowed on Malcolm, King of Scotland, on condition of doing homage for it to himself. He was slain at a banquet, 26th May, 946.

Edmund II, surnamed *Ironside* (c. 980–1016), King of England, the eldest son of Ethelred II. He was chosen king in 1016, Canute having been already elected king by another party. He was defeated at Assandun, in Essex, and forced to surrender the midland and northern counties to Canute. He reigned only seven months.

Edom, in the New Testament *Idumea*, in ancient times a country lying to the south of Palestine, stretching between the Dead Sea and the Gulf of Akabah. The Edomites were subdued by King David,

and were under Judah with intervals of independence till they fell under the rule of the Persians. Their fortunes were afterwards merged in those of Arabia.

Edriophthalmata, one of the great divisions of the Crustacea, including all those genera which have their eyes sessile, or embedded in the head. It is divided into two orders. (1) Amphipoda, e.g. the marine sandhopper and the fresh-water shrimp. (2) Isopoda, of which examples are sea-slaters, fish parasites, fresh-water wood-lice, and land wood-lice.

Edrisi, Abu-Abdullah Mohammed (c. 1100–c. 1180), Arabian geographer. At the request of King Roger II of Sicily he constructed a globe with a map of the earth, which represented all the geographical knowledge of the age. He accompanied this with a descriptive treatise completed about 1154, and still extant.

Education. The Greeks were the first Europeans to treat education as a science. The results they obtained were good, and have to a certain extent determined the course taken by European education ever since. The training set forth by the Greek philosophers, of whom Plato and Aristotle were the most important, was the training thought necessary to fit a man to be a ruler. As the Greek city states were slave states, and most of the manual work was performed by slaves, that necessary part of the training of the youth of the community was ignored. The preliminary training demanded by the Greeks included, besides gymnastics, grammar and music. At a later time these were understood to include the seven arts: Grammar, Rhetoric, Dialectic (*Trivium*), and Arithmetic, Music, Geometry, and Astronomy (*Quadrivium*). To the Greeks, myths were the instruments of the earliest education, the aim of which was the development of a character in the citizen which would lead him to give his best and most loyal services to the State. The aim of Greek education was the formation of the philosophic thinker, the man fitted by nature and training to guide and direct the energies of the man of action. Roman education, on the other hand, directed its efforts mainly to the moulding of the man of action himself. The aim of Roman education was to make a man who could do things; a practical man, a man full of energy, who was ever ready to sacrifice

himself in the interests of the State. The Roman schools, elementary and secondary, seem to have been conducted in a veranda, and boys and girls seem to have been taught in the same school. The chief Roman writers on education are Cicero, Seneca, and Quintilian. The oratorical training of which Quintilian was the expositor seems to have been largely out of touch with real life; and, though he claims that the orator must be a widely cultured, wise, and honourable man, seems to have developed a tendency to the bombastic abuse of ornate and stilted speech. The introduction of Christianity was followed by the inroads into the Roman Empire of barbarous tribes from the north and east. Before these attacks the Western Roman Empire collapsed, and with it to a greater or less extent the educational system of the time. It must be remembered that between three and four hundred years elapsed between the downfall of the Western Roman Empire and the beginnings of the Holy Roman Empire under Charlemagne. Classical or pagan culture, as profane learning, was at a discount, and the aim of the monasticism which grew out of the introduction of Christianity was mystic absorption in the contemplation of God. This interval was followed by the efforts of Charlemagne to revive Roman culture, and to establish schools throughout Western Europe. In this he was aided by Alcuin and other scholars from England, where in the comparative quiet that followed the conquest of Britain there had grown up a system of education. The scholastic education of the Middle Ages laid special stress on formal logic and metaphysics. As a rule, the physical world was ignored, and human intelligence disregarded; but there were notable exceptions, among which the teachings of Bishop Grosseteste (died 1253) and of Roger Bacon (1214-1294) take a prominent place. It was during the period of scholasticism that universities (see *University*) sprang up in different parts of Europe, particularly in Spain, Italy, France, and England. The reaction against authority which marked the Reformation period was specially noted for the reaction against the purely verbal education given to the young. On the Continent Rabelais (1483-1533) led this realistic movement, which was continued by Montaigne (1533-1592) in France, and under the influence of

Bacon by Brinsley and Hoole in England, and Ratke and Comenius on the Continent. Up to this time the chief English writers on the subject of education had been Sir Thomas Elyot in his *Governour*, Roger Ascham in his *Scholemaster*, and Richard Mulcaster in his *Positions*. The intellectual activity which marked in England the closing decades of the sixteenth and the first part of the seventeenth century saw the issue of Milton's *Tractate*, one of the most famous books on education ever produced. Towards the close of the seventeenth century Locke, an English physician and philosopher, published (1693) his *Thoughts concerning Education*, a book which influenced immensely the character and direction of future educational studies. Though his attitude towards the universe was utterly opposed to the attitude of Locke, Rousseau (1712-1778) drew almost all that was practical in his scheme for the education of the young from the English writer. The revolutionary doctrines preached by Rousseau in his *Emile* and in his other educational works had an immense effect on the Continent, and particularly on the work of one of his most ardent admirers, the Swiss farmer and schoolmaster Pestalozzi, whose books were greedily read on the Continent, and aroused the greatest interest. Friedrich Froebel was to some extent a follower of Pestalozzi. His name, however, is specially associated with the schools for very young children to which he gave the name of *Kindergarten* (q.v.). Froebel was not the founder of infant schools. These were first established on the Continent and in Britain with the object of helping mothers. In Britain their establishment is associated with the names of the educational enthusiasts James Buchanan and Samuel Wilderspin. Herbert, next to Kant and Hegel the most influential of German philosophers, published pamphlets on Pestalozzi's best-known book, *How Gertrude teaches her Children*, and on *The A.B.C. of Sense-perception*, and in these showed what weight he attached to observation as an instrument of education. Two years later he published one of his most notable works on education, *The Esthetic Revelation of the World*, and in 1806 *General Pedagogy*. The nineteenth century was a period of continuously increasing interest in education, and of a generally growing belief in

its utility. It was taken up by the Governments of the different countries. In Britain it was only bit by bit, and with very considerable reluctance, that the Government took upon itself the responsibility for the education of the country. In Scotland a national system of general education, constituted in 1560, remained in force until reconstructed by the Education Act of 1872 (see *Scotland*). Compulsory education was introduced into England in 1870. From 1864 onwards Commission after Commission sought to reduce English secondary education to order. The most notable of these was The Bryce Commission of Enquiry into Secondary Education, 1894-1895, whose recommendations have since been put into force by legislation. One of the results of the increasing interest in education throughout England was the founding, early in the latter half of last century, of great day schools, like the City of London, St. Paul's, and Merchant Taylors, in London and other large cities; and, after the passing of the Education Act of 1902, the establishment everywhere of Council Secondary Schools. Of the immense number of works on education issued during the last half of the nineteenth century, perhaps the best known are those of Herbert Spencer and of Professor Bain. Of practical English educators during the nineteenth century, the most outstanding names are undoubtedly those of Arnold of Rugby, Thring of Uppingham, Abbott of the City of London School, and Sanderson of Oundle. In recent times the advances made in the theoretical and practical studies of the sciences of anthropology, physiology, and psychology have exercised an enormous influence on educational theories and practices. Careful observations of young children by scientific observers like Darwin, Dearborn, and Preyer have added greatly to our knowledge of child-nature, and helped to suggest new methods of studying it and developing it. The result has been the promulgation within the present century of a number of educational methods, some of which, in contrast to the older practices, must seem almost revolutionary. Among these must be remembered the 'Heuristic Method' of teaching science put forward by Professor H. E. Armstrong. The object of the method is to put the student as completely as may be in the position of

an original investigator; and it has been classed by writers on education as being, like so many other modern methods, a 'play method'. Froebel in his kindergarten was one of the first to introduce successfully the play method in education, and the 'gifts' by which the plan was carried through were of his own devising; but such cannot be said of Dr. Montessori, whose method of education engrosses so much attention at the present time. The Montessori apparatus was originally devised by Dr. Seguin for the instruction of mental defectives. Dr. Montessori used the apparatus first for the training of young children; but the cardinal feature of the Montessori system is the determined effort to make the child entirely responsible for his own education, and to interfere as little as possible with his development. Experimental education has been attempted both in Germany, where the need for it was first put forward by Kant, and in England; but it is in the United States of America that the chief advances in this direction have been made. There the Binet attempt to measure the intelligence of the child, to fix in fact a metric scale of intelligence, has been elaborated, and the Binet-Simon system of tests devised, and later modified by L. M. Terman. There, too, schools have been established which have tried the working out of what may be described as the non-interference with the pupil principle. Among these may be mentioned the 'George Junior Republic' and the Gary Schools. To this must be added the 'Dalton Laboratory Plan', tried lately as an experiment by Miss Helen Parkhurst in a public secondary day school in Dalton. By this plan, the time-table is abolished, the child undertakes to get up a certain amount of work each month in each particular subject, and is left free to distribute his time as he chooses, so that he can devote more time to those subjects in which he is backward. The school is divided into departments (laboratories) each under a specialist who gives the help needed, but leaves the pupil to himself as much as possible.—BIBLIOGRAPHY: Norwood and Hope, *Higher Education of Boys in England*; Browning, *An Introduction to the History of Education Theories*; Sleight, *Educational Values and Methods*; Nunn, *Education: Its Data and First Principles*; Dewey, *Schools of To-morrow*; Rusk, *Intro-*

duction to Experimental Education; Montessori, The Montessori Method.

Education Act, the name given to several Acts dealing with education in Great Britain. Among the principal Education Acts are: (1) that of 1870, which introduced compulsory education; (2) that of 1891, which reduced, or in some cases abolished, school fees; (3) that of 1902, which authorized the levying of an education rate; and (4) that of 1918, which raised the age for leaving school, and made education compulsory up to the age of eighteen by means of continuation schools. A Bill to raise the age for leaving school to fifteen and to provide maintenance grants to necessitous parents during the extra year was introduced into Parliament in 1930.

Edward, known as *the Elder* (c. 870–925), King of England, son of Alfred the Great. He succeeded his father in 901.

Edward, surnamed *the Martyr* (c. 963–978), King of England. His reign of four years was chiefly distinguished by ecclesiastical disputes. He was treacherously slain by a servant of his stepmother at Corfe Castle.

Edward, surnamed *the Confessor* (c. 1004–1066), King of England, was the son of Ethelred II. On the death of his maternal brother, Hardicanute the Dane, in 1041, he was called to the throne. He was a pious but incompetent ruler. He was succeeded by Harold, the son of Godwin.

Edward, Prince of Wales, surnamed *the Black Prince* (1330–1376), the eldest son of Edward III and Philippa of Hainault. In 1346 he commanded part of the forces at the battle of Crécy. In 1355 he commanded the army which invaded France from Gascony, and distinguished himself the following year at the battle of Poitiers. A campaign in Castile, on behalf of Pedro the Cruel, and the heavy taxes laid on Aquitaine to meet the expenses, caused a rebellion, and ultimately led to war with the French king.

Edward I (of the Norman line) (1239–1307), King of England, son of Henry III. His father's death in 1272 gave him the crown. He commenced a war with Llewellyn, Prince of Wales, which ended in the annexation of that Principality to the English Crown in 1283. Baliol, who in 1292 had done homage to Edward for the crown of Scotland, was forced by the

indignation of the Scottish people into war with England. Edward entered Scotland in 1296 and devastated it with fire and sword. Next summer a new rising took place under William Wallace. Wallace's successes recalled Edward to Scotland with an army of 100,000 men. Wallace was at length betrayed into his hands and executed as a traitor, but Bruce again unfurled the flag of Scottish independence. Edward marched against him, but died at Burgh-on-Sands, near Carlisle. Edward I was wise in council and vigorous in action. During his reign great progress was made in the establishment of law and order throughout the land.

Edward II (1284–1327), King of England, succeeded his father, Edward I, in 1307. After marching as far as Cumnock, in Ayrshire, he dismissed his troops. His weakness for a clever but dissolute young Gascon, Piers Gaveston, on whom he heaped honours without limit, roused the nobles to rebellion. Gaveston was executed as a public enemy on 19th June, 1312. Two years after this, Edward assembled an immense army to check the progress of Robert Bruce, but was completely defeated at Bannockburn. In 1322 he made another abortive expedition against Scotland. Edward's queen, Isabella, whom he had alienated, landed in Suffolk in 1326, and the king was taken prisoner and confined in Berkeley Castle, where he was murdered.

Edward III (1312–1377), King of England, son of Edward II by Isabella of France. On his father's deposition in 1327 he was proclaimed king under a council of regency, while his mother's lover, Mortimer, really possessed the principal power in the State. The pride and oppression of Mortimer led to his seizure and execution (10th Oct., 1330). Edward now turned his attention to Scotland, and defeated the regent Douglas at Halidon Hill in July, 1333. This victory produced the restoration of Edward Baliol, who was, however, again expelled, and again restored. Edward then invaded France. The battle of Crécy (25th Aug., 1346) was succeeded by the siege of Calais. In the meantime David II, having recovered the throne of Scotland, invaded England with a large army, but was defeated and taken prisoner by a much inferior force under Lord Percy. In 1348 a truce was concluded with France; but on the death of King Philip, in 1350,

Edward again invaded France, plundering and devastating. Recalled home by a Scottish inroad, he retaliated by carrying fire and sword from Berwick to Edinburgh. Gradually all the English possessions in France, with the exception of Bordeaux, Bayonne, and Calais, were lost.

Edward IV (1442-1483), King of England. His father, Richard, Duke of York, was grandson of Edmund, Earl of Cambridge and Duke of York, fourth son of Edward III. Edward, on the defeat and death of his father at the battle of Wakefield, assumed his title, and, having entered London after his splendid victory over the troops of Henry VI and Queen Margaret at Mortimer's Cross in Feb., 1461, was declared king by acclamation. The victory of Towton, soon after his accession, confirmed his title, and three years after this, on 4th May, 1464, the battle of Hexham completely overthrew the party of Henry VI. Mainly on account of an imprudent marriage, Edward was compelled to fly in 1470. Henry's title was once more recognized by Parliament. But in 1471 Edward landed at Ravenspur, in Yorkshire, and his army marched swiftly on London and took Henry prisoner. The battles of Barnet and Tewkesbury both ended in decisive victories for Edward. Edward was preparing for an expedition against France when he died.

Edward V (1470-1483), King of England, the eldest son of Edward IV, succeeded his father in 1483. His uncle, the Duke of Gloucester, soon made himself king as Richard III, and caused the young king and his brother to be sent to the Tower, where he had them smothered by ruffians.

Edward VI (1537-1553), King of England, son of Henry VIII by Jane Seymour. At his father's death he was only nine years of age. His reign was, on the whole, tumultuous and unsettled. He restored many of the grammar schools suppressed by Henry VIII; these schools are still known as King Edward's schools.

Edward VII (1841-1910), King of Great Britain and Ireland and Emperor of India, eldest son of Queen Victoria and the Prince Consort. On 10th March, 1863, he was married to Princess Alexandra, eldest daughter of Christian IX of Denmark. On the death of Queen Victoria on 22nd Jan., 1901, he succeeded to the throne, and was crowned on 9th Aug.,

1902. King Edward did much to promote friendly relations with foreign powers, especially with France and the United States. It was through his personal influence that the Entente Cordiale with France was brought about. To him and Queen Alexandra were born: Albert Victor Christian Edward, Duke of Clarence and Avondale, born 1864, died 1892; George Frederick Ernest Albert, who succeeded his father as George V (q.v.); Princess Louise, born 1867, died 4th Jan., 1931, married 1889 to the Duke of Fife, who died 29th Jan., 1912; Princess Victoria, born 1868; and Princess Maud, born 1869, married 1896 to Prince Charles of Denmark, now King of Norway as Haakon VII.—BIBLIOGRAPHY: E. Legge, *King Edward in his true Colours*; J. P. Brodhurst, *The Life and Times of Edward VII*; Sir Sidney Lee, *King Edward VII: a Biography*.

Edward, Thomas (1814-1866), Scottish naturalist. An interesting biography of Edward (*Life of a Scottish Naturalist*), written by Samuel Smiles, appeared in 1876.

Edward, Lake (Edward Nyanza), an African lake lying between the Uganda Protectorate and the Belgian Congo, west of Lake Victoria. The area is 830 sq. miles.

Edwards, Amelia Blandford (1831-1892), English novelist and Egyptologist. Among her best-known novels are: *Hand and Glove* (1859), *Half a Million of Money* (1865), and *Lord Brackenbury* (1880). Miss Edwards founded the Egypt Exploration Fund in 1882.

Edwards, John Passmore (1823-1911), British philanthropist and journalist. In 1862 he bought *The Building News*, and in 1876 the London *Echo*, of which he was director for twenty years. He founded numerous Passmore Edwards institutions, public libraries, and settlements, and contributed largely to hospitals.

Edwards, Jonathan (1703-1758), American theologian and metaphysician. After more than twenty-three years of zealous service as minister at Northampton (Mass.), he was dismissed by the congregation owing to the severity with which he sought to exercise church discipline. He then went as a missionary among the Indians at Stockbridge, in Massachusetts. Here he composed his famous work on the *Freedom of the Will*, which appeared in 1754.

Edwy (c. 940–959), King of England, son of Edmund I, succeeded his uncle Eddred in 955, but was driven from the throne to make way for his brother Edgar.

Eecloo, a town, Belgium, province of East Flanders, a seat of textile manufactures. Pop. 13,536.

Eel, the popular name of fishes belonging to the teleostean sub-order Apodes. The common eel (*Anguilla vulgaris*) is the type of a special family (Anguillidæ), and is found all over the world. It is snake-shaped, devoid of ventral fins, and the minute scales are embedded in the slimy skin. The life-history of the eel has only recently been made out. After many years' investigation Dr. J. Schmidt was able (1922) to show that the eel remains in fresh water for a period of five to twenty years. Then the migratory instinct awakens and the eels descend to the sea. The spawning takes place in deep water, perhaps in the middle of the Sargasso Sea. The young eels enter the rivers, as smoky-brown elvers, when they are about three years of age. Eels are esteemed as an article of food. See *Conger-eel*; *Muraena*; *Electrical Fishes*.—Cf. *Nature*, Nov. 25, 1922.

Efficiency, in mechanics and engineering, the ratio of the useful energy given out by a machine to the energy supplied to it. Energy cannot be created or destroyed, but it may assume various forms, and, within limits, can be changed from any one of these forms to any other. A machine or engine is an apparatus for converting energy in some given form into energy in another assigned form. In practice it is found impossible to convert the whole of the given energy into the form wanted, there being always a residue which is not of the right kind, and is, therefore, counted as useless. The smaller the residue, the more efficient is the machine. The efficiency of a steam-engine is usually compared with that of an ideal engine working between the same temperatures, and going through a definite periodic set of operations called the Rankine cycle. If the thermal efficiency of an actual engine is 27 per cent, and that of an ideal engine working on the Rankine cycle is 30 per cent, obviously the important figure is the ratio of 27 to 30, or 90 per cent. The performance of a steam-engine depends, not only on its *thermal efficiency*, but also on its *boiler efficiency*

and its *mechanical efficiency*. The boiler efficiency is the percentage of the heat obtainable from the fuel consumed which is actually used in the engine; in a good boiler it may be 75 per cent. The mechanical efficiency is the ratio of the work given out at the crank-shaft to the work done on the piston; in other words, it is the ratio of brake horse-power to indicated horse-power. It may perhaps be 80 per cent. To arrive at the over-all efficiency, the various partial or component efficiencies must be multiplied together. Taking coal at 10,000 British thermal units per pound, and Diesel oil at 18,000 British thermal units per pound, Mr. T. R. Wollaston has given the following figures for the number of British thermal units consumed per brake horse-power hour: steam-engine, 19,000; steam turbine, 21,000; gas-engine, 15,000; Diesel engine, 9000. Electrical plant in general reaches a high standard of efficiency. Electrical transformers are the most efficient of all machines. Their efficiency ranges from about 90 per cent in small sizes up to perhaps 98·5 per cent for large machines at full load. See *Energy*; *Internal-combustion Engines*; *Steam-engines*; *Thermodynamics*.

Efflorescence, the property which certain hydrated salts have of losing water when exposed to air. Thus washing-soda, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, if left in air becomes opaque, loses its crystalline appearance, and finally falls to a powder by loss of water.

Egbert (d. 839), considered the first king of all England. He succeeded Brihtric in 802 as King of Wessex, and rendered the other kingdoms dependent on him in 829, thus becoming their overlord.

Egede, Hans (1686–1758), Norwegian missionary. In 1721 Egede set sail for Greenland, and for fifteen years performed the most arduous duties as missionary. In 1736 he returned to Copenhagen, where he was made a bishop and director of the Greenland Missions.

Eger, German name for *Cheb* (q.v.).

Eger (Erlau), a town, Hungary, on the Eger, 65 miles E.N.E. of Budapest. It has several manufactures and is famed for red wine. Pop. 28,050.

Egg, (1) in the narrower sense, the female reproductive or germ-cell, which after impregnation or fertilization by a male germ-cell (spermatozoon or sperm)

develops into an embryo (see *Ovum*).

(2) The term is applied, more broadly, to a more complicated reproductive body that consists of an ovum together with supplementary parts. The egg of a bird, for example, includes the fertilized and developing ovum (yolk), nutritive white (albumen), and protective double egg membrane covered by a porous calcareous shell. The eggs of animals lower than the birds have usually only three parts, viz. the germinal spot or dot, the germinal vesicle, and the vitellus or yolk, the first being contained in the vesicle, and that again in the yolk. A hen's egg of good size weighs about 1000 grains, of which the white constitutes 600, the yolk 300, and the shell 100. Eggs form an important article in British commerce; the number imported in 1923 amounted to the value of c. £17,000,000, mainly from Denmark, Austria, France, Irish Free State, Egypt, China, and Italy.

Egga, a town of North Nigeria, on the right bank of the Niger, a few miles above the Baro-Kano railhead. It is the commercial outlet of a vast region, and manufactures pottery, cloth, and leather goods. Pop. 10,000.

Eggar, or **Egger**, a name given to moths of the family Lasiocampidæ. *Lasiocampa trifolii*, a well-known British moth, is called the grass-egger, and the *L. quercus* the oak-egger, from the food of their caterpillars.

Eggleston, Edward (1837–1902), American novelist and miscellaneous writer. His works include: *The Hoosier Schoolmaster* (1871), *Rowy* (1878), and *The Faith Doctor*.

Egg-plant, or **Brinjal** (*Solanum melongena*), nat. ord. Solanaceæ, an herbaceous plant, from 1 foot to 18 inches high, with large white or purplish flowers. The fruit is about the size of a goose's egg. It is cultivated in India, the United States, &c.

Egham, an urban district of England, Surrey, on the Thames opposite Staines, with the Royal Holloway College for women. Pop. (1931), 15,915.

Eginhard, or **Einhard** (c. 770–840), friend and biographer of Charles the Great (Charlemagne). His *Vita Caroli Magni* is a work of great value, and his letters are also important.

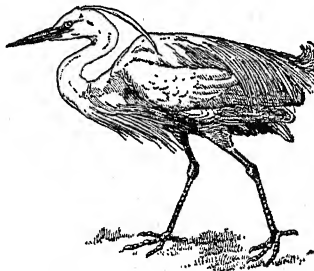
Egmont, Lamoral, Count, Prince of Gavre (1522–1568). He became involved

in the political and religious disputes which arose between the Netherlands and their Spanish rulers. He tried to adjust the difficulties between both parties. In 1567 the Duke of Alva was sent with an army to the Netherlands. One of his first measures was to seize Count Egmont and Count Horn. After a trial before a tribunal instituted by Alva himself they were executed at Brussels 5th June, 1568. A well-known drama of Goethe's is founded on the story of Egmont.

Egoism, as a philosophical doctrine, maintains that his individual ego is the only being that a man can logically assert to exist, and that the elements of all knowledge and the reality of things known are dependent on the existence of the knower. **Egotism**, a distinct idea, is the practice of talking and thinking too much of oneself. As an ethical theory (practical egoism) it is the opposite of altruism.

Egremont, a town of England, Cumberland, in the valley of the Ehen, 3 miles from the sea. Iron ore and limestone are worked. Pop. (1931), 6015.

Egret, a name given to those species of white herons which have the feathers of the lower part of the back elongated and their webs disunited, reaching to the tail



Little Egret (*Ardëa garzetta*)

or beyond it at certain seasons of the year. The American egret (*Ardëa egretia*) is about 37 inches long to the end of the tail; plumage soft and blended; head not crested; wings moderate; the tail short, of twelve weak feathers. The European egret (*A. alba*) is about 40 inches long, of a pure white plumage; the bill is black or dark-brown, yellow at the base and about the nostrils, and the legs are almost black. The little egret (*A. garzetta*) is about 22

inches long from bill to end of tail; the plumage is white. The aigrette plumes of commerce, often incorrectly called osprey, form part of the plumage of these birds at the breeding season. To get them in good condition the bird has to be killed.

Egypt, a kingdom in North-East Africa, bounded by the Mediterranean Sea, Italian Libya, the Anglo-Egyptian Sudan, the Red Sea, and a line from Rafa to the head of the Gulf of 'Aqaba. In 1925 the boundary with Cyrenaica was adjusted. The total area, including the Libyan Desert and the Sinai Peninsula, is 383,000 sq. miles, but of this the settled area (the Nile Valley and Delta) is only 12,226 sq. miles. Upper Egypt, stretching from Halfa to Beni Suef, is an undulating plateau rising in the west to a height of 2000 feet, while Lower Egypt (the Delta lands) is a fertile plain. The peninsula of Sinai, bounded on the west by the Suez Canal (q.v.), is mountainous. There are numerous oases (Siwa, Bahariya, Farafra, Dakhla, Kharga, &c.) much used by caravans. The destinies of Egypt are ruled by the Nile (q.v.), the basin of which is extremely fertile. By means of canals and reservoir works (at Aswan, Isna, Asyut, and Zifta), large areas are irrigated. The construction of a new barrage at Nag Hamadi was commenced in 1927. The total cultivable area is about 8,500,000 acres. In 1927 the principal crops and the areas devoted to them were:

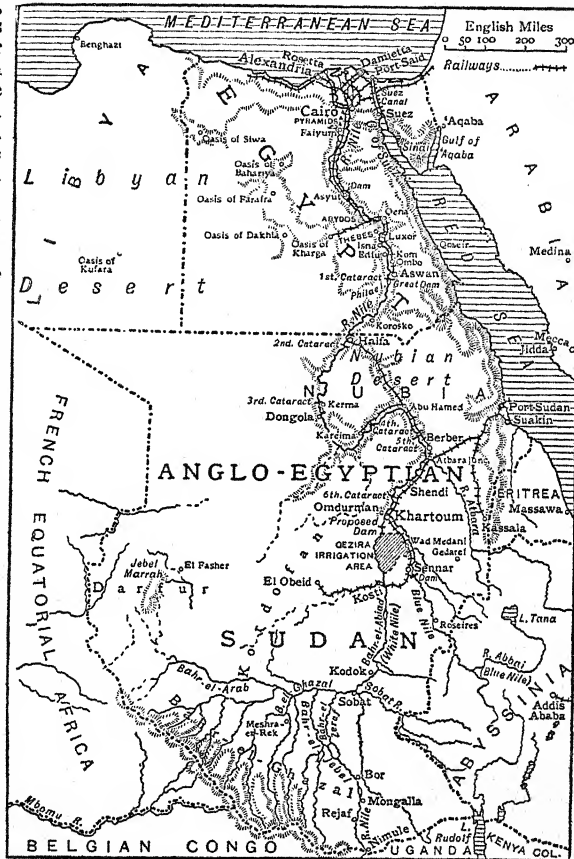
Crop.	Area in Acres.
Maize ..	2,218,000
Cotton ..	1,850,000
Wheat ..	1,650,000
Beans ..	465,000
Barley ..	376,000
Millet ..	265,000
Lentils ..	84,000
Sugar-cane ..	49,000

Rice and onions are also grown. Sugar, cotton, and rice are cultivated from March to October, and cereals from November to May. The chief mineral products are petroleum from the coasts and islands of the Red Sea (1928 output, 268,323 M. tons), phosphates from the Red Sea coasts and Upper Egypt (1928 output, 200,000 M. tons), manganese ore from Sinai (1928 output, 137,502 M. tons), ochre from Aswan, and gold and jewels from

the deserts. The chief manufactures are connected with cotton, but cigarette-making and sugar-refining are also important. There is a Government oil-refinery at Suez, and other industries are the making of railway rolling stock (Cairo), attar of roses (Faiyum), soap, and pottery. The natives weave rugs and make ornamental wares in their own homes. The value of exports in 1928 was £E56,165,256, and of imports £E52,043,969. The chief articles of export were cotton (£E45,137,823), cereals, &c. (£E6,772,377), oils (£E784,392), animal food products (£E369,201), and tobacco (£E346,249). British exports to and imports from Egypt in 1928 were respectively £11,185,000 and £26,336,000. The monetary unit of Egypt is the gold Egyptian pound (£E) of 100 *piastres*, valued at £1, 0s. 6½d. sterling. There are gold, silver, nickel, and bronze coins in circulation, and British sovereigns are legal tender (value, 97½ *piastres*). The chief measure of capacity is the *ardeb* (43·555 gallons), while the weights are the *roll* (·9905 lb.) and the *oke* (2·75 lb.). The unit of length is the *diraa* (22·8 inches), and the unit measure for land is the *faddan* (1·038 acres). The capital of Egypt is Cairo, ports are Alexandria, Port Said, Port Fuad, and Suez, and other important places are Tanta, Damanhur, Mansura, Damietta, Aswan, Faiyum, Beni Suef, Asyut, and Zagazig. The population of Egypt was in 1927, 14,168,756; of this number 12,650,000 are Moslems, 854,700 are Orthodox, and 47,000 are Protestants. The chief seats of Koranic learning are at Cairo (the Mosque and University of El Azhar), Tanta, Damietta, and Alexandria. The total number of students attending these institutions is about 15,000. There are in Egypt large numbers of native Christians attached to Oriental Churches; of these the Copts are the most important. Education is well advanced, there are numerous elementary vernacular schools (*mak-tabs*), industrial and commercial schools, technical and special schools, and higher colleges (law, medicine, training of teachers, &c.). The army is under British control, and there is also a small British army of occupation. Cairo is the head-quarters of the Middle East Air Command. There are in Egypt 2272 miles of State railways (1165 miles are in Upper Egypt). There are also 854 miles of private railways.

Early Religion and Civilization.—In the prehistoric period the Nile was identified with Osiris, who, according to the traditions of the Delta people, once reigned as their king. In the Pyramid Texts (c. 2700 B.C.) Osiris is the controller of the Nile, the principle of life in the Nile, and the Nile itself. Osiris continued to live after death. On earth he was in barley, fruit, &c., and in the fertilized soil. He was in the other world Judge and King of the Dead. The Osirian cult had origin in the Delta of Lower Egypt. In Upper Egypt a solar cult exalted Horus, the falcon god, as chief deity. Although the sun-cult of Heliopolis exalted Ra (or Re) as King of the Gods, the belief that all that existed originated in water persisted till the end. The water-mother was Hathor, who gave birth to Osiris. Ra, the sun-god, was, like Osiris, regarded as her son. Her attributes were in time absorbed by Isis. At the dawn of the Dynastic Age the religious beliefs of the Egyptian peoples were already well developed, the agricultural mode of life was established in the Nile Valley and in the Delta area, the calendar had been introduced, while copper weapons and implements were in use. The subsequent history of the official religion has a political aspect. Local cults rose into prominence as a city-state or ruling family achieved political ascendancy. Memphite theology and the Memphite god Ptah (the god of artisans) assumed importance when the city of Memphis became the capital of the united kingdom. Heliopolis ('the city of the sun') was the northern centre of the solar cult, which, during the fourth and fifth dynasties (c. 2900–2625 B.C.), became influential enough to impose

its theology on the court. The popular Osirian faith was absorbed. Pharaohs were 'Sons of Ra', the sun-god, and Ra supplanted the southern sun-god Horus. Before the Pyramid Age the Osirian and Horite cults had been blended, and Horus became



Egypt and the Anglo-Egyptian Sudan

the son of Osiris. Although the living Pharaoh, however, was the son of Ra, he was also a Horus; after death he became an Osiris. In later times the chief gods of the reigning families were blended forms of Amon, Ra, Ptah, and Osiris. The cult of Serapis, the bull form of Osiris, was popular.

Arts and Crafts.—No finer gold ornaments have ever been produced anywhere than those of the twelfth dynasty (c. 2000 B.C.). Statuary in limestone, wood, and copper in the early dynastic period was vigorous and realistic. The sculptors were using the hardest material by the time of the Pyramid Age (c. 2700 B.C.). A great tomb-statue of Pharaoh-Khafra, in diorite, preserved in the Cairo Museum, is one of the triumphs of Egyptian sculpture. A great advance in the manufacture of pottery was achieved during the Pyramid Age, when the potter's wheel was invented. To Egypt the ancient world owed this notable contrivance. Shipbuilding is another Egyptian industry which promoted progress. In all histories of shipping and navigation the ancient Egyptians are credited with being the pioneers of maritime enterprise. The custom of mummification arose in Egypt, and promoted the study of anatomy. Surgery had its origin in mummification, as astronomy had in astrology, and chemistry had in alchemy.

History.—The legendary Pharaoh who united Upper and Lower Egypt was Mena or Menes. From his time (c. 3400 B.C.) till the close of the sixth dynasty (c. 2475 B.C.) the capital was Memphis. This period is known as that of the 'Old Kingdom'. Among its outstanding monarchs were Khufu, Khafra, and Menkure of the fourth dynasty, the builders of the largest pyramids. Herodotus refers to them as *Cheops*, *Chephren*, and *Mykerinos*. The 'Middle Kingdom' begins with the rise of Thebes in Upper Egypt as the centre of political power. In the period of the famous twelfth dynasty (c. 2000–1788 B.C.) the Theban monarchs established a uniform control of Egypt. The later kings of this dynasty were unable, however, to withstand the inroads of Asiatics, and the Middle Kingdom came to an end with the Hyksos invasion. Of the Hyksos, the so-called 'Shepherd Kings', little is known. They were civilized Asiatics, and during their overlordship of Egypt, which embraced the thirteenth till the seventeenth dynasties (c. 1800–1575 B.C.), the horse and chariot were introduced into Egypt. The Hyksos were finally expelled by Pharaoh Aahmes, who founded the eighteenth dynasty. The Empire period was then inaugurated. Egypt's greatest emperor, Thothmes III (1515–1461 B.C.),

extended his conquests to the borders of Asia Minor, and received tribute from the Hittites, and even from Cyprus and Crete.

In the nineteenth dynasty (1850–1205 B.C.) much of the lost territory was recovered. Rameses II (1325–1258 B.C.) found it necessary about 1300 B.C. to conclude a treaty of peace with the Hittites, the Assyrian Power at the time becoming very powerful and aggressive. Rameses III of the twentieth dynasty was the last great Pharaoh of the Empire period. No fewer than nine Pharaohs named Rameses ruled in Egypt after Rameses III. Most of these were priest-kings. A Libyan dynasty held sway for about two centuries (950–750 B.C.). The last Ethiopian Pharaoh, Taharka, was in 662 B.C. overcome by the invading army of the Assyrian Emperor, Ashur-banipal. The northern royal family of Sais then came into power, and the twenty-sixth dynasty, which lasted for about 130 years (662–525 B.C.), was inaugurated by Psamtik I. Pharaoh-Necho, referred to in the Bible, was the second ruler. In 525 B.C. Egypt was conquered by Cambyses and became a Persian province, with short interruptions of weak native dynasties (the twenty-eighth to thirtieth), until in 332 B.C. Alexander the Great seized it and founded Alexandria. The Ptolemaic dynasty afterwards held sway for about three centuries. Egypt became a Roman province in 30 B.C.

In A.D. 642 the Romans finally abandoned Egypt, which, till 868, became a province of the successive Mahomedan caliphates of Medina, of Damascus, and Baghdad. The Turkish soldiery dominated Egypt for a period. The Shia heretics afterwards became powerful, and the Christians were well treated. In 1250 the Mamelukes (descendants of slaves) came into power. They came under Turkish sway early in the sixteenth century, but when Napoleon conquered Egypt in the eighteenth century they were again semi-independent. The British drove the French out of Egypt. Mehemet Ali, an Albanian officer in a Turko-Albanian force, had himself declared Sultan of Egypt, but when he overran Syria and threatened to march to Constantinople, Russia intervened. Britain and France afterwards prevailed on Mehemet Ali to rule Egypt as the viceroy of the Sultan of Turkey. His successor

and grandson, Abbas I, built the first railway in Egypt. The next viceroy, Said Pasha, son of Mehemet Ali, granted to a French company the right to construct the Suez Canal. Egypt became bankrupt under his successor, Ismail Pasha, the first Khedive (Prince), during whose reign the Suez Canal was opened. He was deposed when the British and French took over the control of Egyptian finance. During the term of his successor, Tewfik Pasha, the Arabi Pasha rebellion took place. The military occupation of Egypt by British troops was followed by peace and good government. But trouble broke out in the Sudan. Mohammed Ahmed declared himself the Mahdi (Messiah) of the Mahommedans, and conquered a great part of the Sudan. In Nov., 1883, General Hicks ('Hicks Pasha') led an army of 10,000 Egyptians against the false prophet, which was entirely destroyed by the Mahdi's force. In 1884 General Gordon was sent to Khartoum as Governor-General of the Sudan, but was completely isolated there and eventually slain. The Mahdi died in 1885, and was succeeded by Abdallah the Khalifa. After a period of reorganization and preparation in Egypt, the reconquest of the Sudan was begun. Lord (then Sir Herbert) Kitchener was Sirdar, or Commander-in-Chief of the Egyptian army, and in April, 1898, the Khalifa's army was defeated on the banks of the Atbara, and on 2nd Sept. Kitchener won a great victory near Omdurman. The Khalifa was rounded up by Sir Reginald Wingate's force and slain in 1899. Thereafter the Sudan came under the control of a British-Egyptian *condominium*, which appointed a Governor-General.

At the time of the outbreak of the European War, in 1914, the Khedive of Egypt was in Constantinople and sided with the Central Powers. He was consequently deposed by Britain, and Prince Hussein Kamil (uncle of the deposed Khedive) was declared Sultan of Egypt; the suzerainty of Turkey terminated at the same time. Hussein Kamil died in 1917, and was succeeded by Ahmed Fuad Pasha. Under the Peace Treaty, Egypt was recognized as an independent kingdom, and in 1922 the British Protectorate came to an end, though the army remained under British control and certain other stipulations were made in order to safeguard British interests. The new Constitution

was promulgated in 1923, and declares Egypt to be a Sovereign State, its monarchy hereditary, and its Government representative. The Parliament consists of a Senate and of a Chamber of Deputies, and the liberty of the individual and of religious belief is guaranteed. Ahmed Fuad Pasha became king in 1922. Zaghlul Pasha, the *Wafd* or nationalist leader, who became Prime Minister in 1924, encouraged hostility to Britain, and in Nov., 1924, Sir Lee Stack, Governor-General of the Sudan and Sirdar, was shot at and fatally wounded in the streets of Cairo. This murder projected a crisis, but Viscount Allenby, the British High Commissioner, acted promptly, and soon had the situation well in hand. At the same time Britain informed the Powers that she would brook no interference in Egyptian affairs. In 1928 the actions of the *Wafd* forced the King to suspend Parliament, but the Constitution was restored and a new Parliament elected in 1929 owing to the necessity for parliamentary consideration of the proposed treaty between Britain and Egypt. This treaty, which was described by Mr. Arthur Henderson, the British Foreign Minister, as "the extreme limit" to which the British Government could go, was bitterly opposed by the *Wafd* party.—BIBLIOGRAPHY: J. H. Breasted, *Development of Religion and Thought in Ancient Egypt*; Flinders Petrie, *A History of Egypt*; Sir A. Colvin, *The Making of Modern Egypt*; Sir V. Chirol, *The Egyptian Problem*; P. F. Martin, *Egypt—Old and New*; Baedeker's *Egypt*.

Egyptian Vulture (*Neophron percnopterus*), a bird that frequents both shores of the Mediterranean, but rarely passes farther north, though it has been found in the British Islands. It is one of the smaller vultures, about the size of a raven. The general colour is white, the quill feathers of the wing being dark-brown.

Ehrenberg, Christian Gottfried (1795–1876), German scientist. His great work on Infusoria appeared in 1835, and was at once recognized as the highest authority on the subject. It was followed in 1854 by his *Microgeology*.

Ehrlich, Paul (1854–1915), German physician. His studies in the histology of blood are very important, but his claim to fame is based upon his discovery of

salvarsan (606) and of *neosalvarsan* (614), arsenic compounds which are very efficacious in the treatment of syphilis. In 1908 he shared the Nobel prize for medicine with Metchnikoff.

Eibenstock, a town in the south-east of Saxony, with important manufactures of lace. Pop. 9528.

Eichhorn, Johann Gottfried (1752–1827), German Orientalist, historian, &c. Amongst his works are: *The Hebrew Prophets* and *History of the Last Three Centuries*.

Eider, a river of Schleswig-Holstein, rises 8 miles south of Kiel, and falls into the North Sea at Tönning; length, 112 miles.

Eider Duck (*Somateria mollissima*), a species of duck found from 45° north to the highest latitudes yet visited, both in Europe and America. They breed in great numbers in Iceland and Greenland, and to a lesser extent in the western islands of Scotland. The eider duck is twice as big as a common duck. It haunts solitary places and feeds on shell-fish. Their nests are made of dried seaweed lined with the down plucked from the mother bird's breast. This down, from its superior warmth, lightness, and elasticity, is in great demand for beds and coverlets; and the districts in Norway and Iceland where these birds abound are strictly guarded.

Eiffel Tower, a structure named after the originator, Alexandre Gustave Eiffel (1832–1923). It is one of the sights of Paris, and is by far the loftiest structure in existence. It cost about £260,000. The top may be reached by stairs and lifts. The first stage or platform is at the height of 189 feet. The next platform is at the height of about 380 feet. The third platform is at the height of 906 feet. The tower has been utilized in experiments connected with the fall of bodies, vibration of the pendulum, and pressure of the air. In recent years the tower has become an important wireless telegraphy station.

Eigg, an island on the west coast of Scotland, county of Inverness, about 10 miles from the mainland, and 5 miles long by about 3 miles broad. It has bold, rocky shores, and terminates to the south in a lofty promontory called the Scur of Eigg, with a peak of columnar pitchstone porphyry 1339 feet above the sea, and on one side perpendicular as a wall. Pop. 197.

Eikon Basilikē, the name of a book published shortly after the execution of Charles I in Jan., 1649, and supposed by some to have been written by the king himself. At the Restoration Gauden, afterwards Bishop of Worcester, laid claim to the authorship. The question is not yet settled. Within a year of its publication 48,000 copies of the book were sold, and the Republicans put forward Milton to answer it, his *Eikonoklastes* appearing the same year by order of Parliament.

Eildon Hills, a picturesque hill-mass with three summits, south of Melrose, Roxburghshire, Scotland.

Eilenburg, a town, Prussian Saxony, on an island of the Mulde. It has manufactures of calico and chemicals. Pop. 17,400.

Eimbeck, a town of Hanover, 23 miles north of Göttingen. It has manufactures of sugar, tobacco, carpets, &c. Pop. 10,000.

Einsiedeln, a town, Switzerland, in the canton of Schwyz, celebrated for its Benedictine abbey. An image of the Virgin, alleged to possess miraculous powers, annually attracts immense numbers of pilgrims. Pop. 8438.

Einstein, Albert (1879–), German-Jewish physicist, was born at Ulm, Württemberg. He was educated in Munich and in Zurich, and in 1914 was called to the Prussian Academy of Science, Berlin, as successor to van't Hoff. He has become famous as the author of the Theory of Relativity (q.v.). He has made other valuable contributions to theoretical physics, among these being a theory of the Brownian movements and various important applications of the modern quantum theory of energy.

Eisenach, a town of Germany, in Thuringia, at the junction of the Nesse and Hörsel. It has manufactures of pottery, leather, woollen yarn, &c. Pop. 41,375.

Eisenberg, a town of Germany, Thuringia, with various manufactures. Pop. 10,750.

Eisleben, a town, Prussian Saxony, celebrated as the place where Luther was born and where he died. Copper is extensively worked in the neighbourhood. Pop. 24,630.

Eisner, Kurt (1867–1919), Bavarian revolutionary leader. He wrote for the Socialist press and eventually became editor-in-chief of *Vorwärts*. In 1907 he

published a work entitled *The Fall of the Empire*. Eisner took an active part in the Revolution of 1918, and was appointed Prime Minister of Bavaria. A revolutionary and a Socialist, he was, however, opposed to Bolshevism, which he did not hesitate to criticize violently. Whilst on his way from his house to the Foreign Office he was shot at and killed.

Eisteddfod, an ancient assembly of Welsh bards for the purpose of musical and poetical contests. There are two kinds of eisteddfodau, the national or general, and the provincial gatherings which take place in many parts of Wales. The eisteddfod fell into abeyance during the seventeenth century. In 1798 the ancient custom was revived. Eisteddfodau are now held annually in North and South Wales alternately, and are attended by many thousands of people.

Ejectment, in law, an action wherein the title to lands and tenements may be tried and the possession recovered. It is commenced by a writ addressed to the tenant in possession and all entitled to defend the possession, bearing that the plaintiff lays claim to the property in question, and calling upon all interested to appear within a certain time to defend their rights.

Ejector, in mechanical engineering, an appliance for ejecting gases, vapours, or liquids from closed spaces by the use of another gas, vapour, or liquid at a higher pressure. For instance, the air may be extracted from a condenser by an ejector. A jet of steam is directed along a short specially-shaped pipe leading from the condenser to the outside atmosphere. The velocity of the steam when it leaves the jet in the pipe is very high, and in blowing out into the atmosphere it sucks the air from the condenser. The appliance works on the principle of momentum.—Cf. J. Sim, *Steam Condensing Plant*.

Ekaterinburg, a fortified town, Russia, in the government of Perm. It is the mining and metallurgy centre of the Ural regions, and gem-cutting, the making of machinery, cloth, and candles are among the industries. A university was founded here in 1920. Pop. 70,000.

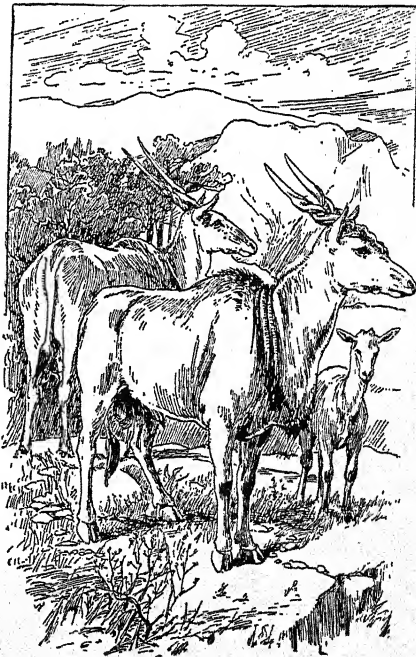
Ekaterinodar, a town of Russia, in the Caucasus, on the River Kuban, with a considerable trade. It has an important cattle trade. A university was established here in 1920. Pop. 107,360.

Ekaterinoslav, a town of the Ukraine, capital of a province of the same name, on the right bank of the Dnieper. It is a manufacturing centre, producing iron, machinery, tobacco, and beer. Pop. 220,100.—The province has great mineral wealth, especially in coal (Donetz basin), iron, manganese, and rock-salt; and its fertile black-earth soil produces abundant crops of wheat and other grains. The exports are grain, cattle, tallow, leather, and hides. Area, 24,478 sq. miles; pop. c. 3,537,300.

Elæagnaceæ, the oleaster family of plants, of which the only British member is the sea-buckthorn (*Hippophaë rhamnoides*).

Elain, the oily principle of fat obtained by submitting fat to the action of boiling alcohol, allowing the stearin to crystallize, and then evaporating the alcoholic solution. It is not unlike vegetable oil in its appearance and its properties, and forms soaps with alkalies.

Eland, *Oreas (Orias) canna*, a species of antelope inhabiting Africa, the largest of



Elands (*Oreas canna*)

all its kind, being about the size of an ox. Its flesh is highly prized. It is now almost extinct south of the Limpopo, but it is plentiful in the Kalahari.

Elanus, the name of certain species of raptorial birds of the genus *Elanus*, belonging to the kites. The type species is the black-winged kite (*E. caeruleus*) of Africa and South Asia, which strays to South-West Europe.

Elaphomyces, a genus of ascomycetous fungi like the truffles (Tuberineæ), but not closely allied to the family. *E. cervinus* (Hart's truffle) is not infrequent in Britain; it forms 'mycorrhiza' with roots of oak, beech, and various conifers.

Elaps, a genus of poisonous American snakes, the type of the family Elapidae, to which belongs the cobra de capello.

El Araish, an Atlantic seaport of Spanish Morocco. Though the harbour is now silted up, there is an extensive trade in grain, fruits, eggs, and wool. Pop. about 10,000.

El-Arish, an Egyptian city on the Mediterranean, on the Wadi el-Arish, and chief city of the territory bearing the same name. Pop. about 20,000.

Elasmobranchii, a sub-class of fishes, including sharks, dog-fishes, rays (skates); and also *Chimæra* (q.v.) and its allies. The skeleton is cartilaginous; the heart possesses a muscular conus arteriosus with numerous rows of pocket-valves; and there are five or more pairs of gill-pouches opening by slits to the exterior. Fertilization is internal, and the male is provided with a pair of copulatory organs (claspers) projecting backwards from the pelvic fins. The group is of great antiquity, and many extinct fossil types are known.

Elasmotherium, an extinct genus of Mammalia, found in the post-Pliocene strata of Europe, comprising animals of great size allied to the rhinoceros, and having probably one large horn and a smaller nasal horn.

Elastic Bitumen, Elaterite, or Mineral Caoutchouc, an elastic mineral bitumen of a blackish-brown colour, and subtranslucent. It has been found at Castleton, in Derbyshire.

Elasticity, the property in virtue of which bodies resist change of volume or of shape, and tend to regain their original bulk or shape when the deforming forces are removed. Solids possess elasticity of volume and of shape. Liquids and gases

have elasticity of volume; they resist compression, but offer only a transient resistance to change of shape (see *Viscosity*). The elasticity of a gas is measured by the pressure to which the gas is subjected, if there is no change of temperature. When a gas is compressed suddenly, it has a greater elasticity on account of the rise of temperature which takes place. Liquids are less compressible than gases; water is compressed by about 1 part in 20,000 when the pressure on it is increased by one atmosphere. A knowledge of the elastic properties of solids is of importance in all branches of applied mechanics. Homogeneous solids offer definite resistance to compression, twisting, stretching, and bending, and this resistance is expressed by a number called a modulus. Let the deforming force be reckoned per unit of area, e.g. a pressure in tons per square inch; this is called the stress. The unital deformation produced by the stress is called the strain, for example, compression per unit of volume. The modulus is obtained by dividing the stress by the strain; if this is done with the above example, the ratio will give the bulk modulus. When the applied forces cause change of shape without change of volume, the ratio of stress to strain is called the shape modulus or the rigidity of the material. This property is brought into play when mechanical power is transmitted by means of shafting. Young's modulus is employed in the cases of stretching and bending. It is given by the ratio stretching force per unit area to stretch per unit length. In 1678 Hooke stated the law that stress is proportional to the strain which it causes. This law is found in practice to be true for metals within a certain range of stress which lies below the elastic limit. If the stress is increased beyond this limit, the material begins to give way, and permanent change of shape or volume takes place. In the processes of riveting and wire-drawing, the material is purposely strained beyond the elastic limit, whilst the correct working of a spring balance requires that the spring should never be over-strained. When metals are subjected to frequently repeated stresses, they undergo a weakening and are said to become fatigued, and are liable to give way under a smaller stress than would otherwise cause fracture. The speed with which sound-

waves are transmitted through a material depends on the elasticity of the material; such compressional waves in water have been employed by the Romanian engineer Constantinesco to transmit power by means of water-pipes.

Elatea (formerly *Cithæron*), a mountain of Greece, separating Bœotia from Megaris and Attica. Its loftiest summit is 4620 feet high.

Elateridæ, the name of a family of beetles, remarkable for their ability to throw themselves to a considerable height in the air, when placed on their back, by a vigorous muscular movement. The larvæ are often very injurious to vegetation, especially those which devour the roots of herbaceous plants (as in the genus *Agriotes*), and are known from their slenderness and hardness as wire-worms. The fireflies of America belong to the family. The largest species of the genus *Elater*, the *Elater flabellicornis*, is 2½ inches in length.

Elaterium, a substance obtained from the fruit of the squirting or wild cucumber (*Ecballium agreste*). The juice of the unripe fruit, when expressed and allowed to stand, deposits elaterium as a green sediment with an acrid taste, a faint odour, and powerful cathartic properties. It is a violent purgative, and is poisonous, but its action is not constant. The active principle in it is called *elaterin*.

Elba, a small island in the Mediterranean, in the province of Leghorn, Italy, separated from the mainland by the Strait of Piombino, about 6 miles wide. The island is 18 miles long and from 2½ to 10½ miles broad, and is traversed by mountains rising to a height of over 3000 feet. It is rich in iron, marble, granite, salt, &c.; and iron ore is exported. Excellent wine and fruits are produced. The tunny fisheries are very important. The island is famous in history, as Napoleon was exiled there from May, 1814, to Feb., 1815. It has two seaports—Porto-Ferrajo (the capital) and Porto-Longone. Pop. 30,450.

Elbasan, a town of Albania, 75 miles s.s.e. of Scutari. It has manufactures of copper and iron goods. Pop. 13,000.

Elbe, an important river in Central Europe. It rises on the south-west slopes of the Schneekoppe between Bohemia and Silesia. From this point it flows through Bohemia, and then takes a general north-

north-west direction till it falls into the North Sea, intersecting Saxony and a considerable portion of Prussia. The finest scenery of its valley is in the Saxon Switzerland. Its length is 725 miles; drainage area, 56,865 sq. miles. The principal affluents are: on the right, the Iser, Schwarz-Elster, and Havel; on the left, the Alder, Moldau, Eger, Mulde, and Saale. It is navigable for about 525 miles, but its estuary is much encumbered with sand-banks. In 1870 its navigation was declared free from Hamburg to Melnik in Bohemia. The North Sea and Baltic ship canal connects its estuary with Kiel Bay, and there are other important connected canals. It is well stocked with fish.

El Beni, a department of Bolivia; area, 95,354 sq. miles; pop. 52,450. The capital is Trinidad.

Elberfeld, a town of Rhenish Prussia, in the government of Düsseldorf, on both sides of the Wupper. It is a great seat of manufacturing industry, among its leading products being cottons, woollens, silks, velvet, mixed textile goods, buttons, ribbons, lace, yarns, thread, carpets, aniline dyes, iron and steel, machinery, pianofortes, and paper. Calico-printing, dyeing, and bleaching are very extensively carried on. It has given its name to a system of poor relief, combining organized voluntary effort and individual treatment. Pop. 157,218.

Elbeuf, a town of France, department of Seine-Inférieure, on the left bank of the Seine. It is an important centre for the production of woollens, and is also an entrepôt for the cloths of Louviers and Sedan. Pop. 19,240.

Elbing, a seaport of East Prussia, on the Elbing, near its entrance into the Frisches Haff. It is a place of considerable industry and trade, the manufactures including iron goods, machinery, brass and tinplate goods. It has also shipbuilding yards. Pop. 67,127.

Elburz, a lofty mountain range extending over Northern Persia, parallel with and overlooking the Caspian. Highest peak, Mt. Demavend (19,400 feet).

El Chaco, a territory of Bolivia; area, 46,561 sq. miles; pop. 13,085.

Elche, a town of Spain, in the province of Alicante, on the left bank of the Vinalopo, surrounded by palm trees. The chief industry is the culture of dates. It trades in esparto, wine, and dates. Each

summer, from the 13th to the 15th of August, a fourteenth-century liturgical drama (*The Representation of the Assumption of Our Lady St. Mary*) is performed. Pop. 33,000.

Elder, a name given to different species of the genus *Sambucus*, nat. ord. Caprifoliaceæ. These are small trees or shrubs, with opposite and pinnated leaves, bearing small white flowers in large and conspicuous corymbs, small berries of a black or red colour, and bitter and nauseous leaves possessing purgative and emetic properties. The wood of the young shoots contains a very large proportion of pith. The common elder of Britain (*S. nigra*) is a wild shrub or small tree, distinguishable by its winged leaves, its clusters of small, cream-white flowers, and the small black berries by which these are succeeded, and from which a kind of wine is sometimes made. The dwarf elder or danewort (*S. Ebulus*) is also found in many parts of Britain.

Elders. In the Presbyterian Churches elders are officers who, with the pastors or ministers, compose the consistories or kirk-sessions, with authority to inspect and regulate matters of religion and discipline in the congregation. As a member of the kirk-session the elder has an equal vote with his minister, and as a member of the higher Church courts, when delegated thereto, he has a right to discuss and vote on all matters under discussion in the same manner as the clergy themselves.

Eldon, John Scott, Earl of (1751–1838), Lord Chancellor of England. In 1793 he became Attorney-General, and in 1799 was created Chief Justice of the Court of Common Pleas, and raised to the peerage and the House of Lords by the title of Baron Eldon. On the accession of the Addington ministry he became Lord Chancellor (1801), and retained this post under the subsequent administration of Pitt until the death of the latter in 1806. A year later, however, he resumed the chancellorship under Liverpool, and held it without break for twenty years.

El Dorado, a country that Orellana, the lieutenant of Pizarro, pretended he had discovered in South America, between the Orinoco and Amazon Rivers; and which he named thus on account of the immense quantities of gold and precious metals which, he asserted, he had seen in Manoa, the capital of the country.

Eleatic School, a Grecian philosophical sect, so called because it originated in Elea (Lat. *Velia*), a town of Magna Græcia (Southern Italy), of which also three of its most celebrated teachers, Parmenides, Zeno, and Leucippus, were natives. The founder was Xenophanes of Colophon. The Eleatic philosophers asserted that change and difference are only empty illusions, and that the only true reality is changeless being. They made the abstract idea of Being or God, deduced from the contemplation of the Universe as a whole, their starting-point. Their reasonings sometimes led them to deny the reality of external phenomena altogether.

Elecampane, a plant of the nat. ord. Compositæ, found in Europe and in Asia. It is 3 or 4 feet high; the radical leaves are often 2 feet and more in length; the flowers are large and yellow; the root, which is perennial, possesses a bitter camphor-like taste, and is used in medicine in chronic bronchitis and tuberculosis.

Election, in theology, the doctrine that God has from the beginning elected a portion of mankind to eternal life, passing by the remainder. It is founded on the literal sense of certain passages of Scripture, and has been amplified by the labours of systematic theologians into a complete and logical system. It dates in ecclesiastical history from the time of Augustine; but Calvin has stated it so strongly and clearly in his *Institutes* that it is generally associated with his name.

Election, in politics, the selection by voting of a person or persons to occupy some post or office. The chief forms of election in Britain are parliamentary and municipal elections, in both of which the ballot has been in operation since 1872. By an Act passed in 1883, and annually renewed, persons convicted of treating, bribery, personation, and undue influence are liable to imprisonment with hard labour. It also imposes many limitations with regard to the number of assistants and committee-rooms, and the use of conveyances. By the Reform Act of 1918, the maximum expenditure for campaign purposes during parliamentary elections is to be sevenpence per elector in county constituencies, and fivepence per elector in boroughs. By this Act the cost of registration is paid half out of local rates, and half by the State. At

election times the returning officer's expenses are to be paid by the Treasury. In county or district borough elections the nomination must take place within ten days of the receipt of the writ, at least three clear days, however, being allowed to elapse between the first public notice and the day of nomination. In ordinary borough elections the candidate must be nominated not earlier than the third day after public notice, and not later than the fourth day after that on which the writ is received. A candidate is nominated in writing, with the signatures of a proposer, seconder, and eight other electors, all registered in the constituency to be represented. In the event of there being more candidates than vacancies, the returning officer adjourns the election for the purpose of taking a poll.—Cf. C. Seymour and D. P. Frary, *How the World Votes*.

Elector, the title of certain princes of the Holy Roman Empire, who had the right of electing the emperors. In the thirteenth century the number of these electors was seven—the Archbishops of Mainz, Cologne, and Trèves, the King of Bohemia, the Count Palatine, the Duke of Saxony, and the Margrave of Brandenburg. In 1648 an eighth electorate was created to make room for Bavaria, and Hanover was added as a ninth in 1692.

Electrical Fishes, a name given to fishes possessing the property of communicating an electric shock, the best known of which is the electric eel (*Gymnotus electricus*), a native of South America. The seat of the four electrical organs is along the under side of the tail, and they are said to possess the power of knocking down a man, and of painfully numbing the affected limb for several hours after the shock. Similar powers are possessed by an African cat-fish (*Malapterurus electricus*), in which the electric organ invests the entire body as a sort of jacket under the skin, and, to a less degree, by electric rays.

Electrical Measuring Instruments, the name given to instruments which measure electric power, energy, voltage, or current. The majority of such instruments are current-operated. Thus, with the exception of electrostatic voltmeters, all voltmeters are really current-measuring instruments; but since this current is made to be proportional to the P.D.

between the voltmeter terminals, the scale reading is proportional to the voltage being measured. One and the same instrument may be used as an ammeter (q.v.) or as a voltmeter, by providing it with shunts for use as an ammeter, and series resistances for use as a voltmeter. By using shunts or series resistances of different values, different ranges can be given to the instruments. The dynamometer type (see *Ammeter*) is specially suitable for power measurements, and practically all *wattmeters* work on this principle. The Siemens Dynamometer was the first instrument of this type. The electrostatic voltmeter mentioned above is the only instrument which is operated by a P.D. instead of a current. In it a moving vane is attracted into a fixed pair of quadrants; or a set of vanes is attracted into a set of quadrant cells.

The majority of electricity meters are of the motor type, i.e. a disc is driven by motor action at a speed which is proportional to the power passing through the meter. The disc spindle engages with gearing which drives the pointers on a set of dials recording the energy units. There are also meters depending on electrolytic action (Wright meter); or on the difference in period between two pendulums, one of which is controlled by the load current (Aron meter).

Electric Battery, a group of primary or secondary cells, suitably arranged for the purpose of producing an electric current. Primary batteries consisting of a few cells are commonly used for intermittent work where a relatively small current is required, e.g. for electric bells. If a larger current is necessary, especially if it has to be maintained over a considerable period, a battery of secondary cells is used. Such batteries are commonly used for country house lighting. Very large batteries, used either alone or in conjunction with automatic reversible boosters, are frequently employed in public electric supply systems. See *Voltaic Cell*; *Secondary Cell*.

Electric Heating. See *Heating, Electric*.

Electricity, the name given to the ultimate cause of electrical phenomena. The laws governing these phenomena are well known, but the actual nature of electricity has not yet been fully revealed, although much light has been thrown on the subject by recent researches (see

Electron). Although the practical applications of electrical phenomena have all been developed within the last sixty years, the production of an electric charge by friction, as demonstrated by the power of rubbed amber to attract light bodies, was observed by a Greek philosopher as long ago as 600 B.C. The Greek name for amber, *ηλεκτρον* (*electron*), is the root from which our word electricity is derived. Friction was the only artificial source of electricity known until Galvani, near the close of the eighteenth century, accidentally obtained it by the contact of two metals with the limbs of a frog; and Volta, developing Galvani's discovery, invented the first galvanic or voltaic battery.

The discovery by Faraday in 1831 of the principle of the production of an electromotive force by the motion of a conductor in a magnetic field, laid the foundation for the development of the electric generator (q.v.), and thus of modern electric power supply.

The study of electrical phenomena is conveniently divided into two branches, one dealing with stationary charges of electricity (*electrostatics*), the other with electric currents (*current electricity*).

Electrostatics.—If a pair of ebonite rods be electrified by friction with flannel, then by suspending the one rod and presenting the other to it, it is easily demonstrated that a mutual mechanical force of repulsion exists between them. If now a glass rod be electrified by friction with silk, it will be found that it attracts the suspended electrified ebonite rod. These experiments reveal the facts that electric charges may be of two opposite kinds, and that like charges repel one another, while unlike charges attract one another.

The charge produced on glass by friction with silk is called *positive*; that produced on ebonite by friction with flannel is called *negative*. All bodies may be electrified by friction, but those which allow a free movement of the charge over them (such bodies are called *conductors*, to distinguish them from *insulators*, which do not allow this free movement) must be held by an insulating handle, or else the charge will be removed as quickly as it is produced.

Coulomb proved that the magnitude of the mutual mechanical force exerted between two charged bodies depends on the amounts of the charges and the distance between them. Faraday called

attention to the influence of the medium in which the charges are placed. Thus if two charges of q_1 and q_2 units respectively are placed d centimetres apart in a given medium, the mechanical force f in dynes exerted between them is given by the

$$\text{equation } f = \frac{q_1 q_2}{K d^2}, \text{ provided the dimen-}$$

sions of the bodies on which the charges are concentrated are small in comparison with d . The coefficient K is called the *dielectric constant* of the medium, and its value is taken as unity for air.

In accordance with this relationship, *unit charge* is defined as that charge which repels an equal and similar charge placed at a distance of 1 centimetre in air, with a force of 1 dyne.

If the medium surrounding a charged body be explored with a unit charge, a mechanical force varying in magnitude and direction from point to point will be found to act on the unit charge. In such a case, an *electric field* is said to exist in the medium.

If lines are drawn, starting from a positive charge and ending on a negative charge, such that the tangent to the line at any point is the direction of the electric force at that point, these lines are called *lines of electric force*. The lines of electric force completely represent the electric field.

The distribution of a charge upon an insulated conductor isolated in space depends upon the shape of the conductor. If the conductor is spherical, the charge is uniformly distributed. If the curvature varies from point to point, the quantity of charge per unit area, or the *electric surface density*, will vary from point to point. The sharper the curvature is, the greater the surface density will be. In sharply pointed conductors nearly the whole charge will be concentrated at the pointed end. Owing to the large charge per unit area at the pointed part, particles of dust, water-vapour, &c., will be powerfully attracted, will become charged by conduction, and will then be powerfully repelled. In this way the original charge will be rapidly dissipated. In lightning-conductors practical advantage is taken of this 'power of points' to dissipate a charge rapidly.

The distribution of the charge on a conductor is influenced by the presence of other conductors, whether charged or

not. This is due to what is called *electrostatic induction*. If an uncharged insulated conductor B is brought near a charged conductor A, a charge of the *opposite* kind is induced on the parts of B nearer to A, and a charge of the *same* kind on the parts farther away from A. Since B was originally uncharged, these induced charges are equal in amount.

If B is now removed to a distance, the induced charges neutralize one another, and B returns to its original uncharged state.

While B is near A, let the induced charge of the *same* kind as the charge on A be neutralized by touching B with an earth-connected conductor, say the finger. On removing B to a distance, it will no longer be uncharged as before, but will have a charge of the *opposite* kind from that on A. B is now said to have been *charged by induction*.

If two charged conductors be connected by a wire, in general it will be found that a flow of electricity from one to the other will take place. This flow is said to be due to a *difference of electric potential* between the two conductors. If no flow takes place, then the difference of potential is zero. Electric potential difference (the contraction P.D. is commonly used) is numerically equal to the work done in carrying a unit charge from the one conductor to the other. If the work is done *against* the electric forces, in moving a unit positive charge from A to B, then B is said to be at a higher potential than A. Although actually it is with *differences* of potential that we have always to deal, it is convenient in many cases to refer these differences to a zero, and speak of *the potential* at a point. The ideal zero of potential would be the potential at a point infinitely far removed from all electrified bodies. In practice it is convenient to regard the potential of the earth as zero. The potential at a point is then numerically equal to the work done in carrying a unit positive charge from earth to the point. The potential at every point on a conductor is obviously the same, for if it were not so, a flow of charge would take place and equalize the potential. If an insulated uncharged conductor be connected by a wire to a charged conductor, a flow of charge will take place until every point on both conductors is at the same potential. The quantity of

charge which each conductor will then have depends on what is called the *capacity* of the conductor.

The *capacity* of a conductor is defined as the quantity of electricity with which it must be charged in order to raise its potential from zero to unity. Thus if Q be the quantity, V the potential, and C the capacity, we have $C = \frac{Q}{V}$. The poten-

tial of a conductor is therefore directly proportional to the charge upon the conductor, and inversely proportional to the capacity of the conductor.

The capacity of a conductor may be increased by placing close to it another conductor which is kept at zero potential. Such an arrangement is called a *condenser*. The Leyden jar (see *Leyden Jar*) is a well-known example of a condenser. The capacity depends not merely on the dimensions of the conductors and the distance between them, but also upon the nature of the dielectric separating them. The ratio of the capacity of a condenser with a given dielectric to the capacity it would have with an air dielectric, is called the *specific inductive capacity* of the dielectric. Numerically the specific inductive capacity of a dielectric is equal to the dielectric constant already mentioned.

The *Wimshurst machine* is an apparatus for generating electricity on the large scale. The machine acts on the induction principle, and if kept warm and dry is self-exciting.

The *electroscope* is a simple piece of apparatus for detecting the presence of an electric charge, determining its sign (positive or negative), and making a very rough comparative estimate of its potential. It consists of a pair of strips of gold-leaf attached to a brass rod terminating in a brass cap. The whole is enclosed in a glass case, or a case having glass sides. The base is made of conducting material. The sides of the case are coated internally with tinfoil (or two rods connected to the base project upwards to the level of the gold-leaf strips). The strips, the brass rod, and the cap must be carefully insulated. When a charged body is brought near the electroscope, the leaves become charged similarly by induction. The repulsion due to the similar charges causes the leaves to diverge.

When accurate quantitative measurements have to be made, an instrument

called an *electrometer* is used. The instrument, the development of which is due chiefly to Lord Kelvin, is capable of making accurate measurements of electrostatic potential differences down to quite low values.

Essentially an electrometer consists of a light suspended conductor which moves within four fixed quadrants. Opposite pairs of these quadrants are connected together, one pair to one terminal, and the other pair to the other terminal of the instrument. The P.D. to be measured is applied at these terminals. The suspended conductor or 'needle' is charged to a definite high potential, and the deflection produced is observed from the movement of a spot of light reflected from a mirror attached to the suspending fibre. In this case the deflection is proportional to the P.D. between the quadrants. For measuring a high P.D., the needle may be connected to one pair of quadrants. With such an arrangement the instrument is less sensitive, and the deflection is proportional to the square of the P.D. between the quadrants.

Current Electricity.—The phenomena connected with the flow of electricity through a conductor come under this heading. Such a flow of electricity will take place if by some means the ends of the conductor are maintained at different potentials. An *electric current* is then said to exist in the conductor. The difference of potential may be maintained by chemical action (see *Electric Battery; Voltaic Cell*), by electro-dynamic action (see *Generator*), or by heat action (see *Thermo-electricity*). The magnitude of the current which will flow when a steady P.D. is maintained between the ends of the conductor is determined by what is called the *electrical resistance* of the conductor. The resistance R is defined as the ratio of the applied potential difference V to the current I produced, i.e. $R = \frac{V}{I}$.

This is a partial expression of Ohm's Law for the Electric Circuit, which in its most general form states that the current which flows at any instant in an electric circuit is equal to the algebraic sum of the electromotive forces existing in the circuit at that instant, divided by the total resistance in the circuit at that instant (see *Electromotive Force*).

For the particular case where the

algebraic sum E of the electromotive forces is steady, and the total resistance R is not varying, we have $I = \frac{E}{R}$. This is

the form which applies to steady direct currents. If the current is changing (whether alternating or merely varying in value), varying E.M.F.'s, in addition to the applied E.M.F., exist in the circuit, and the above expression no longer holds good.

The resistance of a conductor depends on its material, and varies directly as the length, and inversely as the cross-section of the conductor. Thus $R = \rho \frac{l}{A}$, where

ρ is the specific resistance of the material, l the length of the conductor, and A the cross-sectional area of the conductor. The *specific resistance* is the resistance between opposite faces of a unit cube of the material at a definite temperature (usually 0°C.). The resistance of a conductor varies to a greater or less extent with variation of temperature.

For pure metals the resistance increases considerably with increase of temperature. With certain alloys the change is so slight as to be negligible. In some alloys, and in carbon and insulating materials, the resistance falls with increase of temperature.

Measurement of Resistance.—Low resistances can most conveniently be measured by a fall of potential method, based on the relationship $R = \frac{V}{I}$. The current

may be read by an ammeter, and the potential difference by a low-reading voltmeter (see *Electrical Measuring Instruments*). Resistances of moderate value are best measured by a Wheatstone Bridge, or one of its modifications (see *Wheatstone Bridge; Ohmmeter*).

Effects of an Electric Current.—When a current flows in a conductor, the temperature of the conductor is raised. This is due to the power dissipated on account of the resistance of the conductor. The power dissipated is equal to I^2R watts, and by giving suitable values to I and R any required amount of heat per second can be obtained. This *heating effect* of the current is made use of in electric lighting, electric heating and cooking, in electric furnaces, and in certain electro-medical appliances.

If a magnetic needle is brought near

a conductor carrying a current, it will be found to be deflected. This is due to the magnetic field, which is always associated with an electric current. This *electromagnetic effect* is of the utmost practical importance (see *Generator; Electric Motors*).

When a current is passed through a conducting liquid, such as a solution of a metallic salt or a salt in a fused state, chemical action takes place. The behaviour of such a conductor is entirely different from that of a metallic conductor, since a current can flow in it only if chemical dissociation takes place (see *Electrolysis*).

An electric current may be constant in direction (*direct current*), or may alternate in direction with a certain frequency (*alternating current*). Alternating currents have advantages for the transmission of large amounts of power over considerable distances (see *Electric Power Transmission and Distribution*), and may be used for electric lighting and the operation of electro-dynamic machines and apparatus (see *Electric Motors*).

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Electric Light, a light obtained by the conversion of electric energy into light energy. The usual method is to heat some material to incandescence by passing an electric current through it. The material may be carbon (arc lamps), tungsten wire (all modern incandescent lamps), mercury vapour (mercury vapour lamps), or volatilized metallic salts (flame arc lamps).

Ordinary arc lamps, and even flame arc lamps, are being displaced by the modern high-candle-power gas-filled tungsten lamp. Flame arc lamps have a high efficiency, and are still largely used for street lighting, but the cost of the frequent trimming required, even in lamps of the magazine type, gives the gas-filled lamp an advantage over them. Lamps of the mercury vapour class have a high efficiency, and the light has a high actinic value which is valuable for certain photographic processes, but the absence of the red and orange part of the spectrum gives the light a characteristically ghastly effect

which limits the use of this type of lamp.

The Carbon Arc.—Although the arc lamp has fallen into disuse, the carbon arc is still extensively employed for projection work, as in cinema projectors and in searchlights. The action of the carbon arc is as follows: If a potential difference of about 50 volts is maintained between a pair of carbon rods, and the tips of the rods are momentarily brought into contact and then separated by a short distance, then the current is maintained by an arc across the gap. The temperature of the positive tip rises to about 4000° C., and the tip itself soon becomes hollowed, forming what is called the *positive crater*.

Flame Arc Lamps.—The carbon arc principle is modified in these lamps, so that the arc itself supplies nearly the whole of the light. The arc is made highly luminous by impregnating the carbons with metallic salts, which are volatilized and become incandescent in the arc. Their presence also lowers the resistance of the arc, so that its length can be greatly increased.

Mercury Vapour Lamps.—In these lamps the light is obtained from incandescent mercury vapour in a tube from which the air has been exhausted. The positive terminal is connected to a small iron electrode at one end of the tube. At the other end there is a small bulb, which contains a little pool of mercury, which is connected to the negative terminal. To start the lamp, the tube has to be tilted, so that a stream of mercury flows along it and makes contact with the iron electrode. The current which then flows vaporizes some of the mercury, and when the tube is tilted back to its original position, the discharge is maintained through the mercury vapour. A small series resistance is required in order to make the operation of the lamp stable. For small lamps a glass tube is used, but owing to the higher temperature reached in lamps consuming considerable power, it is necessary to use a quartz tube for large lamps. Quartz is transparent to ultra-violet light, and to avoid harmful effects the tube is usually enclosed in a larger one of flint glass, which stops the ultra-violet rays. The more modern forms of mercury vapour lamp are fitted with a device enabling them to start automatically.

Incandescent Lamps.—This is the name

commonly given to the type of lamp in which the light is produced by an incandescent filament. The filament is enclosed in a glass bulb, which is either exhausted to a high vacuum, or else contains an inert gas under pressure. The filament is heated to incandescence by the current passing through it.

The first lamp of this type to come into general use was the carbon filament lamp. This has now been ousted by the much more efficient tungsten filament lamp. The earlier tungsten lamps were very fragile, owing to the brittleness of the filament. Later, a process was discovered whereby tungsten could be made malleable. The manufacture of drawn-wire filaments thus became possible, and the tungsten filament lamps which are now produced will stand a considerable amount of rough handling. This type of lamp is now in universal use for house lighting.

If the bulb is filled with an inert gas under pressure, the filament may be worked at a much higher temperature, and since the light emitted increases with temperature much more rapidly than the power consumption does, the efficiency of the lamp can be greatly increased. These discoveries have led to the development of the modern *gas-filled lamp*. Owing to the high intrinsic brilliancy of the filament, high candle-power lamps of this type can be made which are not unduly bulky. For this reason, and because of their high efficiency and the absence of the need for any adjustment or attention, gas-filled lamps are coming into extensive use. Tubes of varied shape containing the rare gas neon and emitting an effective orange light are used for the display of advertisements in shop windows and elsewhere.

Electric Motors, the name given to that division of dynamo-electric machinery in which electrical power is converted into mechanical power.

Electric motors are classified as *direct-current motors* or *alternating-current motors*, according as the electric power taken by the motor is in the form of a direct current or an alternating current. Further subdivisions of each class are made on the basis of differences in the operating characteristics of the various types.

Direct-current Motors.—The motor consists of a fixed magnetic field system with a rotating armature, which carries the conductors through which the supply

current is passed. The magnetic field, produced in the air-gap between the poles and the armature, reacts with the current-carrying conductors of the armature and produces the *mechanical turning-moment* or *torque*.

At the same time the motion of the conductors through the magnetic field generates an E.M.F. in the conductors. This E.M.F. is in the opposite direction to the applied E.M.F., and is therefore called the *back E.M.F.* of the motor. The current taken by the motor is equal to the difference between the applied and back E.M.F.'s divided by the resistance of the armature winding. Since the armature resistance is always low, and the back E.M.F. is zero at starting, some form of starter is necessary in order to limit the current to a safe value. Essentially the starter consists of a suitable resistance connected in series with the armature. As the motor gains speed this resistance is gradually reduced to zero.

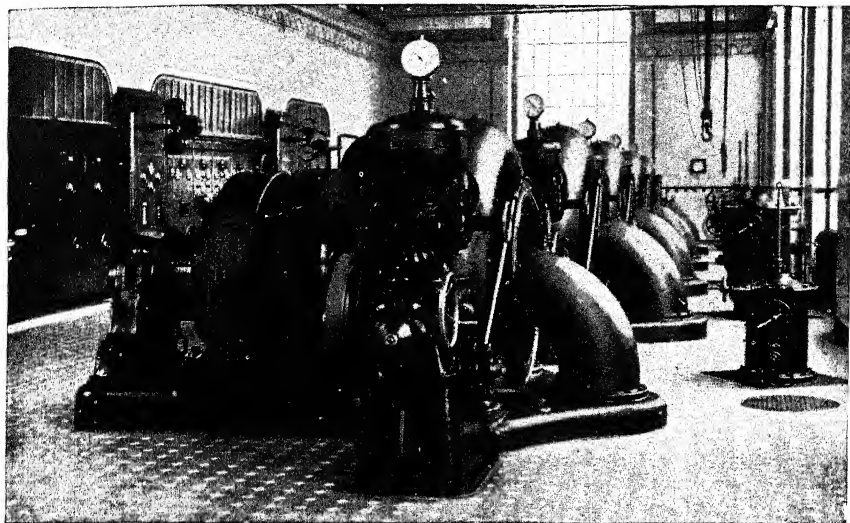
The speed at which a D.C. motor runs varies inversely as the air-gap flux per pole, and, very approximately, directly as the applied E.M.F. (directly as the back E.M.F. actually).

The torque produced is proportional to the product of the air-gap flux per pole and the armature current. The torque and speed characteristics of a D.C. motor, therefore, depend on the manner in which the air-gap flux per pole varies with the load current.

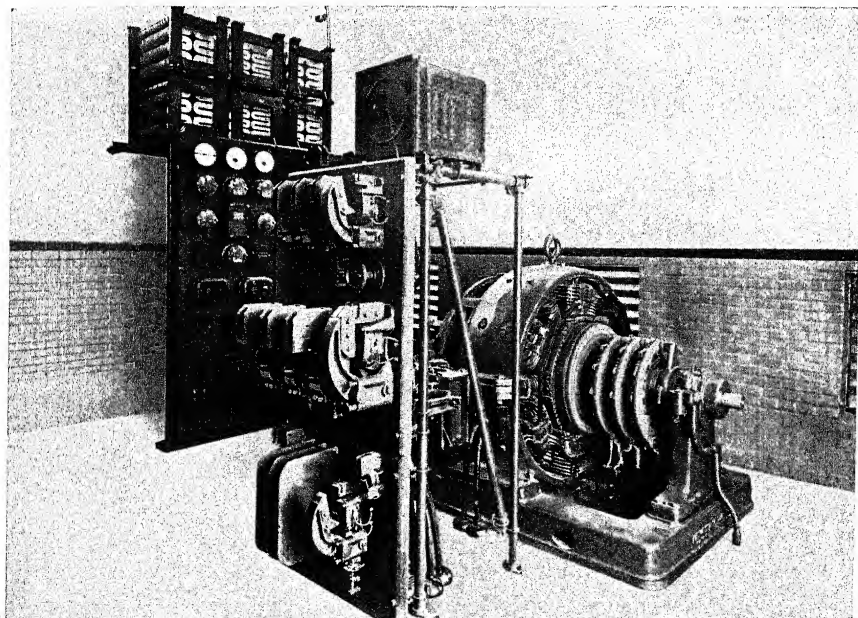
Series Motor.—In this type the field magnet windings are connected in series with the armature winding, i.e. the same current flows in both windings. The air-gap flux per pole, therefore, depends on the current taken by the motor. Consequently, at light loads the speed of the motor is very high, and there is a very large fall in speed as the load increases. The torque increases rapidly with load for the same reason. At starting, a large torque is obtained at a low speed. These characteristics are specially suitable for traction purposes, for crane motors, and for the motors for certain machine tools.

Shunt Motor.—In this case the field magnet windings are connected as a shunt to the armature windings, i.e. the current in the field coils depends upon the applied voltage, and is therefore constant in normal operation. Apart from the slight effect of the armature magneto-motive

ELECTRICAL MACHINERY



Electric Power Station, Chanet, Switzerland. 4 Water Turbines, 1350 h.p. each, and
1 Water Turbine, 400 h.p.



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force, the air-gap flux per pole, therefore, remains almost constant at all loads. This means that the speed is practically constant at all loads (a very slight fall in speed with load occurs), and the torque, therefore, is almost directly proportional to the load current. The shunt motor is therefore suitable for all cases where an approximately constant speed at all loads is required.

Alternating-current Motors.—There are wide differences between the various types, both in construction and operation. The type most commonly used is the polyphase *induction motor*. In this motor both the field system and the armature consist of a slotted core built up of iron laminations. The field system is called the *stator*, and the armature the *rotor*. Both carry conductors in their slots, and these conductors in each case form a polyphase winding. Current is supplied to the stator winding only. The currents in the rotor winding are *induced* by the action of the rotating magnetic field set up by the stator currents. Hence the name induction motor. For starting, a polyphase resistance completes the circuits of the rotor winding. This resistance is gradually reduced to zero as the motor attains its full speed.

The rotor circuits are therefore closed upon themselves in normal operation. In many motors (especially small ones which are started unloaded) the rotor winding consists of a series of copper bars brazed to solid end-rings at each end of the core, thus forming a permanently short-circuited winding. Such a rotor is known as a *squirrel-cage rotor*.

The speed characteristic of the induction motor closely resembles that of the shunt D.C. motor, and induction motors are suitable for similar purposes. The induction motor gives its maximum torque at a speed only slightly below the synchronous speed (corresponding to the number of poles in the stator winding and the frequency of the supply); and the torque decreases very rapidly as the speed rises towards synchronism. The maximum torque has a definite value for a given motor, and if the load demands a greater torque than this, the motor slows down and stops.

Synchronous motors are seldom used except for special purposes. They are exactly similar to the ordinary synchro-

nous generator or alternator in construction, and the field system is almost invariably the rotating part. As their name implies, these motors have the characteristics of running at synchronous speed at all loads. If through overloading, or for any other reason, the motor is unable to maintain its synchronous speed, it immediately falls out of step and stops.

Alternating-current Commutator Motors.—These motors are in general appearance similar to the induction motor, but the rotor is fitted with a commutator. According to the electrical connexions, these motors may be given characteristics similar to direct-current series or shunt motors. Single-phase commutator motors with series characteristics are used on the Southern Railway electric trains (L.B. & S.C.R.).

Electric Power Transmission and Distribution. In the public supply of electric power in this country, the usual practice is to use alternating-current generators in the power stations, and to transmit the power at a high voltage to substations. The substation plant reduces the pressure to a value suitable to the consumer, and in many instances also converts the alternating current into direct current. From the substations the power is distributed to the consumers.

In order to reduce the outlay on cables, it is important that the transmission voltage should be as high as the circumstances permit. In America, where large amounts of power are transmitted over very great distances, the pressure used is in some cases 150,000 volts, and the tendency is to raise this still further, as switch gear, insulators, and other apparatus capable of withstanding this high pressure are becoming available. For high-tension underground cables, the pressure now coming into common use is 20,000 volts.

There are certain advantages in the use of direct current, but the substation plant is more costly and requires skilled attendance. If the circumstances are such that these advantages are not important, the lower initial cost and running expenses of an alternating-current distribution would lead to its adoption.

Electric Telegraph. See *Telegraphy*.

Electric Traction and Electric Tramway. In electric traction the mechanical power required for the propulsion of the vehicle is obtained from

electric motors. These motors are usually *series direct-current motors*, but for railway work single-phase and three-phase A.C. motors have also been successfully employed (see *Electric Motors*).

In electric tramways, except in some few instances where there are objections to the use of an overhead construction, the current is conveyed to the motors through a trolley pole carrying a wheel running on an overhead bare copper wire. A hand-operated drum controller, directly controlling the driving and electric braking of the motors, is used. A hand-brake, and commonly a separate electro-magnetic brake, are provided.

Except in very small tramway systems, the power is generated as high-tension alternating current, and transformed and converted at substations suitably placed in the area covered by the tramway (see *Electric Power Transmission and Distribution*). The low-tension D.C. power is distributed from the substations to the trolley wire. The car rails are earthed, and provide a return path for the current. See *Railways, Electrification of*.

Electrolysis is the name given to the decomposition of fused salts or solutions of salts, &c., by means of the electric current, and is thus a branch of electro-chemistry. The substance through which the current is passed is termed the *electrolyte*, and may be either an acid, base, or salt in a fused state or in solution. The current enters the electrolyte by an electrode called the *anode*, or the positive terminal. The electrode by means of which the current leaves the electrolyte is termed the *cathode*, or negative terminal.

During the passage of the current the electrolyte is decomposed, and the products of decomposition are released at the electrodes or terminals. According to the modern theory of electrolysis, all electrolytes contain a greater or smaller number of free *ions*. These ions are chemical radicles carrying a definite electric charge. The kind of charge, positive or negative, depends on the nature of the radicle. The ions exhibit none of the chemical properties of the uncharged radicle.

Thus, for example, in an aqueous solution of sulphuric acid, free ions of hydrogen H_2 carrying a positive charge, and free ions of SO_4 carrying a negative charge, exist. An *uncharged* SO_4 radicle would react with the water present, and sul-

phuric acid would be formed and oxygen liberated. The ion SO_4 , however, is incapable of doing this. Owing to the nature of their charges, the hydrogen ions will move towards the negative electrode, and the SO_4 ions towards the positive electrode. On reaching the electrodes the ions give up their charges, and immediately exhibit their ordinary chemical properties. Hydrogen is given off at the negative electrode, while at the positive electrode the uncharged SO_4 radicle reacts with the water present, and oxygen is released.

The stream of ions carrying their positive and negative charges constitutes the current flowing through the electrolyte. Since the ions carry definite charges, it follows that the amounts of the initial products of an electrolytic action are in the ratio of their chemical equivalents. Thus, if fused silver chloride be electrolyzed, for every 108 grammes of silver deposited at one side of the vessel 35.5 grammes of chlorine are given off at the other side.

The laws of electrolysis are: (1) *The electrolytic action of the current is the same at all parts of the circuit.*

(2) *The same quantity of electricity decomposes chemically equivalent quantities of different electrolytes.*

(3) *The quantity of the electrolyte decomposed in a given time is proportional to the strength of the current.*

The practical applications of electrolysis include the refining of copper, the electro-deposition of metals, electro-plating, electrotyping, and the production of metallic sodium and potassium (see *Electro-metallurgy*). Electrolytic action is also made use of in the storage of electric energy in secondary batteries (see *Secondary Cell*).

Electro-magnetism, that branch of science which deals with the mutual relations between electric and magnetic fields (see *Electricity; Magnetism*).

It may readily be shown that when an electric current flows in a conductor, a magnetic field is produced around that conductor, i.e. that a magnetic field is produced by the motion of an electric field. Similarly, if a magnetic field is moved at right angles to a conductor, a potential difference is established between the ends of the conductor, i.e. an electric field is produced by the motion of a magnetic field.

If a conductor is placed in a magnetic field so that its length is at right angles to the lines of magnetic force and an electric current is passed through the conductor, a mechanical force will act on the conductor, and this force will be at right angles both to the conductor and to the original magnetic field.

All the phenomena of electro-magnetic action have their basis in these three effects, viz. (1) the production of a magnetic field by an electric current (the principle of the electromagnet); (2) the production of an E.M.F. or P.D. by the relative motion of a magnetic field and a conductor (the principle of the electric generator); and (3) the mutual mechanical action between a current-carrying conductor and a magnetic field system (the principle of the electric motor).

The strength of the magnetic field produced by the current may be increased by winding the conductor in the form of a helix or solenoid consisting of a number of turns. The effect can be very greatly increased by providing the solenoid with a soft-iron core. The iron is strongly magnetized as long as the current flows. Such an arrangement is called an *electromagnet*. Electromagnets specially designed to produce a very intense magnetic field are used commercially in handling scrap-iron, pig-iron, &c. The electromagnet takes the place of the crane-hook in an ordinary crane. When the current is switched on, the pieces of iron are attracted and held firmly until the current is switched off again.

Electromagnets are also used for extracting fragments of iron or steel from the eye, and for many laboratory purposes. Their most important practical use is the production of the magnetic field required in dynamo-electric machinery (see *Generator*; *Electric Motors*).

Electro-medical Apparatus. Electrical apparatus is now widely used in the treatment and diagnosis of disease. The action of the heart may be very accurately observed by means of the electric cardiograph, which consists of a very sensitive 'string' galvanometer (see *Galvanometer*) and an arrangement whereby the spot of light is focused on a moving photographic plate. In this way a photographic record is obtained of the variations of potential differences which occur during a heart-beat. An important electro-medical treat-

ment consists of the local introduction of a drug into the affected part by electrolytic action. Thus in the treatment of rodent ulcer, a pad of lint saturated with a 5 per cent solution of zinc sulphate is placed over the ulcer, and by means of an electric current zinc ions are carried into the ulcer. A number of diseases may be treated in this way, the ion used depending on the nature of the case. Low-frequency intermittent currents from induction coils are frequently used where nerve stimulation or muscular contractions are required. Static electricity is also used for similar purposes. Large Wimshurst machines (see *Electricity*) are used for the treatment of sciatica, and also for neurasthenia. High-frequency apparatus is valuable for the treatment of rheumatism in its earlier stages, and for the stimulation of the scalp in hair treatment.

Electro-metallurgy is that branch of metallurgy which uses electrical energy, wholly or in part, for the extraction or treatment of metals. The energy may be converted into heat and used for processes in which high temperatures are necessary, or it may be used for the decomposition of a compound by electrolysis, which may proceed in a fused bath at a comparatively high temperature, or in a solution bath containing a compound of the metal dissolved in a suitable solvent.

The former method of utilizing the energy embraces electrothermal processes, and the latter method electrolytic processes.

In electrothermal processes, the heat developed by the electric current has been used in a number of industries, including welding, annealing, heat treatment, smelting, refining, &c. For electric welding (q.v.) of metals there are two systems in use: resistance welding, in which the portions to be welded are pressed together and heated by the resistance they offer to the passage of a current; and arc welding, in which portions of metal of the same composition as that to be welded are fused on by striking an arc from a suitable electrode. In electric smelting, the high temperature of the arc (3600° C.) may be used for the reduction of certain metallic oxides, which at the lower temperature of furnaces heated by coal, coke, gas, &c. (2000° C.), will not give up their oxygen to carbon. The production of refined steel,

special alloy steels, and certain non-ferrous alloys is also carried out in electric furnaces of various types. Electric furnaces are now used in the production of pig-iron, steel, ferro-alloys, brass, zinc, &c., and in the heat treatment of various metals. Classifying them according to the manner in which the electrical energy is converted into heat, we have:

(1) Direct resistance furnaces, in which the heat effect is produced within the metal itself by the resistance offered to the passage of the current through it. This type is used in the refining of steel. (2) Indirect resistance furnaces, to which class belong the various tube and crucible furnaces used in laboratories. The vessels to be heated are wound with wire or ribbon of high resistance, such as platinum, nickel-chrome alloys, &c., and a suitable current passed. (3) Induction furnaces, in which a primary coil of copper wire is used, the secondary being formed by the metal charge itself, contained in a suitable annular groove. In this furnace the current passes through the primary and induces a current in the charge, thus melting it. This type of furnace has been largely used in the refining of steel, and to some extent in the melting of non-ferrous metals and alloys. (4) Direct arc-heating furnaces. (5) Indirect arc-heating furnaces. (6) Combined resistance and arc furnaces are very largely used for the production of ferrous alloys, such as ferro-silicon, ferro-chrome, and ferro-manganese; for the production of steel from scrap; and for the final refining of steel produced by other processes. There are several well-known commercial furnaces working on this principle, the best known probably being the Héroult.

The effect of the European War has been enormous on the development of the electric furnace in this country, and also in France.

Electrolytic Processes.—The application of electrolysis for the production of metals from a fused electrolyte is most important in the case of aluminium. This metal cannot be produced by direct electrolysis in aqueous solution, but is deposited electrolytically from a fused bath of cryolite, containing alumina in solution. As the metallic aluminium is extracted from the molten bath, further quantities of purified oxide are added. The anodes consist of carbon blocks suspended in the molten

bath, and the cathode consists of the reduced and molten aluminium. Calcium, cerium, lithium, magnesium, potassium, sodium, and strontium are obtained by the electrolysis of fused chlorides, sodium being also obtained from fused hydroxide and fused nitrate.

It is in connexion with the refining of metals that electrolytic processes become of prime importance. Pure copper is now commonly obtained from impure copper anodes in an electrolyte of copper sulphate containing free sulphuric acid. Gold is also refined by a similar process, the electrolyte used consisting of gold chloride solution containing free hydrochloric acid. Silver is likewise refined in a silver nitrate bath. In all the above-mentioned processes the anode is cast from the impure metal to be refined, and the cathode consists of a sheet or plate on which the pure metal is deposited. It will be seen that these refining processes are very similar to electro-plating methods.

Electromotive Force, the name given to the force tending to produce a flow of electricity in an electric circuit. The electromotive force, or E.M.F., is measured in terms of the work done in carrying unit quantity of electricity once round the circuit.

Thus unit electromotive force (absolute) is said to exist in a circuit if 1 erg of work is done in carrying 1 c.g.s. unit of electricity once round the circuit. The potential difference, or P.D. (in electro-magnetic units), between two points in an electric circuit is similarly defined in terms of the work done in carrying 1 unit of electricity from the one point to the other.

Production of an Electromotive Force.—There are several sources of E.M.F., e.g. (a) chemical action, as in primary and secondary cells; (b) thermo-electric action, as in the thermopile; (c) electro-magnetic action, as in generators, motors, transformers, and induction coils.

The principle of the electro-magnetic generation of an E.M.F. may be stated in its most general form as follows: If lines of magnetic force are interlinked with an electric circuit, and if by any means the number of interlinkages of the lines of magnetic force with the circuit is made to change, then an E.M.F. will be generated in the circuit, the magnitude of this E.M.F. being proportional to the time rate of change of the interlinkages.

A permanent magnet may be moved so as to vary the lines of magnetic force linked with an electric circuit, as in magneto-generators; or the circuit may be moved through a magnetic field (see *Generator*; *Electric Motors*); or the magnetic field produced by a current in one coil linked with a second coil may be varied by varying the current in the first coil, as in static transformers and induction coils.

The electro-magnetic generation of an E.M.F. is the fundamental principle which has made possible the generation and utilization of electrical energy on a large scale.

Electron, the atom of electricity, more especially of negative electricity. The first light on the question of the structure of electricity came from the laws of electrolysis (q.v.), established by Faraday. These laws are explained very naturally if we make the assumption that electricity, like matter, is atomic, the atom being the charge carried by the hydrogen ion. On this view any charge is supposed to be made up of a very great number of electrons, just as a material body is composed of atoms of matter. A metallic conductor is supposed to contain many free electrons, which normally bear much the same relation to the material molecules as a saturated vapour bears to the liquid in equilibrium with it. When an electromotive force is applied, it causes a drift of the electrons in the opposite direction to the force, the charge on the electrons being negative. It is this drift of electrons which constitutes an electric current.

The striking advances that have been made in our knowledge of the nature of electricity since the last years of the nineteenth century have been due chiefly to the study of the electric discharge in gases. The properties of the cathode rays, which stream from cathode to anode in a tube containing gas of very low pressure, suggested to Crookes that the rays consist of material particles carrying a negative charge and moving at a high speed; but many physicists rejected this explanation, holding that the rays were due to some form of wave motion in the ether. About 1897 it was conclusively shown by Perrin, Wiechert, and Sir J. J. Thomson that Crookes's view was the correct one. Sir J. J. Thomson measured the velocity of the particles, and also the ratio of the

charge e to the mass m of each. His method was to subject a fine beam to the action of two fields of force, one magnetic, the other electric, and both perpendicular to the line of motion and also to each other. The deflections were observed, and the fraction e/m and also the velocity v were deduced by calculation. The velocity had various values, up to one-third the velocity of light. The fraction e/m , however, had always the same negative value, no matter how the material of the cathode and the nature and pressure of the gas were varied.

Many other ways of obtaining these negatively charged particles, or electrons, are now known. The β -rays from radioactive substances (see *Radio-activity*) are simply electrons moving with great speeds, approaching sometimes within 2 or 3 per cent of the velocity of light. Hot metals give off electrons copiously; this property is used in the construction of the Coolidge X-ray tube and of the thermionic valve (q.v.). A metal plate illuminated by ultra-violet light, from an electric arc or spark, for instance, gives off electrons moving at all velocities below a certain maximum (see *Photo-electric Effect*). From whatever source the electrons are derived, their properties are found to be the same.

Methods of determining the charge and mass of an electron separately were devised by Townsend, C. T. R. Wilson, Sir J. J. Thomson, H. A. Wilson, and notably by Millikan of Chicago. Millikan's result, which is most probably the best yet found, is that $e = 4.774 \times 10^{-10}$ absolute electrostatic units, or 1.591×10^{-20} absolute electro-magnetic units.

The value of e/m , as determined by Thomson's method described above, is 1.76×10^7 e.m.u. per gramme, or 5.29×10^{17} e.s.u. per gramme. Taking this with Millikan's value for e , we find $m = 0.902 \times 10^{-27}$ grammes. The exact determination of e has made it possible to assign precise values to several other important physical constants, which formerly were only known roughly from data depending on the Kinetic Theory of Gases. Thus Avogadro's constant N , or the number of molecules in one gramme-molecule (molecular weight in grammes) of any gas can be connected with e by the exact measurements of electrolysis, which give $Ne = 9650$ e.m.u. It follows that

$N = 6.06 \times 10^{23}$, and that the number of gas molecules per cubic centimetre at 0°C . and 76 centimetres pressure is 2.70×10^{19} . We find at once also the mass of the hydrogen atom as 1.66×10^{-24} grammes, the density of hydrogen being known to be 0.0899 grammes per litre. The mass of the electron is therefore about $1/1840$ of the mass of the hydrogen atom, which till the isolation of the electron was the smallest mass known.

It is necessary, however, to scrutinize with some care the meaning of the word mass as applied to an electron. An electron being entirely different in its physical nature from ordinary matter, the question arises whether its mass is actually a definite constant, as it is for a material particle, according to the accepted principles of Newtonian dynamics. Now it can be shown, as was first done by Sir J. J. Thomson, that a moving charged body possesses inertia in virtue of the mere fact that it carries a charge. The value of this inertia, or electro-magnetic mass, when the velocity is small compared with that of light is, in a vacuum, for a small sphere of radius a , $\frac{2}{3}e^2/a$, where e is the charge. A more general theory was given by Lorentz, and verified experimentally by Bucherer, and it is now regarded as highly probable that electrons are devoid of all mass except the electro-magnetic mass due to their charge of negative electricity. This mass is not a constant, but depends on the velocity of the electron, becoming exceedingly great as the velocity approaches that of light.

No fundamental positive electron has been isolated which at all corresponds to the negative electron, or corpuscle, as it is called by Sir J. J. Thomson. The nearest approach to a positive electron is the nucleus of the hydrogen atom, which carries a positive charge of the same magnitude as the charge on an electron. Practically the whole mass of the atom resides in this nucleus. According to the modern theory of the structure of matter, the neutral atom of any element is built up of a comparatively small number of electrons and an equal number of these positive nuclei. See *Ionization*; *Isotopes*; *Matter*; *Radio-activity*; *Rays*, *Electric*.—**BIBLIOGRAPHY:** J. A. Crowther, *Ions, Electrons, and Ionizing Radiations*; R. A. Millikan, *The Electron*; J. A. Cranston, *The Structure of Matter*.

Electro-plating, the process of depositing a coating of some selected metal on a given surface by means of electrolysis (q.v.). The most important classes of electro-plating commonly carried out are nickel-plating, used very largely for a variety of articles made of iron, steel, &c.; copper-plating, used for facing printing-blocks and as a first coating to non-metallic substances prior to silver- or gold-plating; silver-plating, for imitation silverware and for cutlery, &c.; gold-plating, for ornamental ware, jewellery, &c. Previous to plating it is necessary to remove all grease, dirt, oxide, &c., from the surface. For the actual deposition an electrolytic cell is prepared, containing a solution of a suitable salt of the metal to be deposited, with an anode, generally consisting of a plate of the same metal, attached to the positive pole of the battery used, the article to be treated being connected with the negative pole and thus forming the cathode. When a current of electricity is passed through the solution, a thin coating of metal is deposited on the article forming the cathode, and an equivalent portion is carried into solution from the anode. For iron simple dipping is sometimes used, as copper is readily deposited on iron without the use of an electric current. For electro-plating of copper, anodes of metallic copper, having a surface equal to that of the articles to be coated, are used. For silver-plating the solution consists of the double cyanide of silver and potash, and may be used either hot or cold. In ordinary circumstances the deposited metal presents a dead or matted appearance, and if a bright polished effect is desired, it is burnished and buff-polished.

Electrotype. See *Printing*.

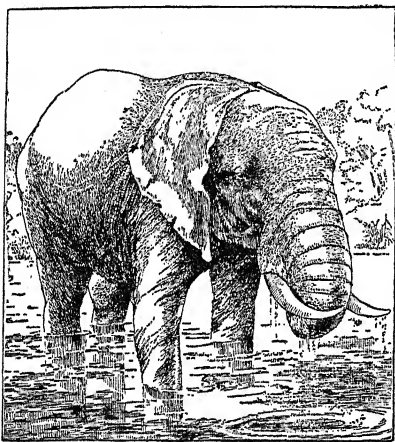
Elegit, in English law, a writ by which a creditor who has obtained a judgment against a debtor, and is hence called the *judgment-creditor*, may be put in possession of the lands and tenements of the person against whom the judgment is obtained, called the *judgment-debtor*, until the debt is fully paid. The writ is addressed to the sheriff, who enforces it.

Elegy, a mournful and plaintive poem or funeral song, or any serious poem of a melancholy contemplative kind. In classic poetry what is known as *elegiac verse* is composed of couplets consisting of alternate hexameter and pentameter lines.

Elements. See *Chemistry*; *Matter*.

Elemi, an oleoresin obtained from *Canarium commune*, and used in medicine externally in the form of ointment in cases of ulcers and chronic skin diseases.

Elephant, the popular name of a genus, family, or sub-order of five-toed proboscidian mammals, usually regarded as comprehending two species, the Asiatic (*Elephas indicus*) and the African (*E. africanus*). From a difference in the teeth, however, the two species are sometimes referred to distinct genera (*Euelephas* and *Loxodon*). The African elephant is distinguished from the Asiatic species by its greater height, its larger ears, its less elevated head and bulging or convex fore-



African Elephant (*Elephas africanus*)

head, the closer approximation of the roots of the tusks, and the greater density of the bone. It has also only three external hoofs on the hind-feet, while the Asiatic has four. All elephants are remarkable for their large, heavy, short bodies supported on columnar limbs, a very short neck, a skull with lofty crown and short face-bones, with the exception of the premaxillaries, which are enlarged to form tusk-sockets. To compensate for the short neck, they have the long proboscis, often 4 or 5 feet in length, produced by the union and development of the nose and upper lip. It is made up of muscular and fibrous tissue. The trunk is of great strength and sensibility, and serves alike for respiration, smell, taste, suction, touch,

and prehension. The tusks, which are enormously developed upper incisor teeth, are not visible in young animals, but in a state of maturity they project in some instances 7 or 8 feet. Elephants attain the general height of about 9 or 10 feet. Their weight ranges from 4000 to 9000 lb. It is said that they live to the age of 150 years. They feed on vegetables, the young shoots of trees, grain, and fruit. They associate in herds of a considerable size under the guidance of a single leader. The domesticated elephant requires much care and a plentiful supply of food, being liable to many ailments. The daily consumption of a working elephant is, according to Sir J. E. Tennent, 2 cwt. of green food, about half a bushel of grain, and about 40 gallons of water. Several extinct species are known, the most notable being the mammoth (*E. primigenius*), a contemporary of prehistoric man. The allied genus *Mastodon* was of very wide distribution, and the Tertiary deposits of the Fayum (Egypt) have yielded the remains of types that bridge over the gap between elephants and more typical quadrupeds. See *Mammoth*; *Mastodon*.

Elephanta Isle, or Gharapuri, a small island in the Bay of Bombay, between Bombay and the mainland. It is celebrated for its rock temples or caves, one of which contains a huge trimurti or Hindu Trinity: Brahma, Vishnu, and Siva, still worshipped by the Bania caste. The few inhabitants rear sheep.

Elephant-fish (*Callorhynchus antarcticus*), a fish of the sub-class Elasmobranchii (rays and sharks), inhabiting the Antarctic seas.

Elephantiasis is a disease characterized by progressive enlargement of a limb, or portion of the body, and occurs most frequently in the legs. The onset may be slow and painless, or sudden with fever and rapid swelling. In rapid cases rest, liquid diet, purgation, and firm bandaging of the legs are indicated.

Elephantine, the Greek name of a small island of Egypt, in the Nile, just below the First Cataract and opposite Aswan (Syene). It is partly covered with ruins of various origins, including the Nilometer mentioned by Strabo.

Elephant Island, a small uninhabited island in the South Shetlands, almost entirely covered with ice and snow. It

was the starting-point of Shackleton's memorable boat journey to South Georgia in 1916.

Elephant River, a river of Cape Colony, running into the Atlantic after a course of 140 miles.

Elephant-seal, the Proboscis Seal, or Sea-elephant, the largest of the seal family (Phocidæ). There are probably two species, one (*Macrorhinus angustirostris*) found only on the coast of California and Western Mexico, the other



Elephant-seal (*Macrorhinus*)

(*Macrorhinus leoninus*) found in Patagonia and the Southern Seas. They vary in length from 12 to 30 feet, and in girth at the chest from 8 to 18 feet.

Elephant's-foot, the popular name of *Testudinaria elephantipes*, a plant of the nat. ord. Dioscoreaceæ (yams, &c.), known in the Cape Province as Hottentots' Bread.

Eleusinian Mysteries, the sacred rites anciently observed in Greece at the annual festival of Demeter or Ceres, so named from their original seat Eleusis. The greater Eleusinia were celebrated in the month Boedromion (September-October), beginning on the 15th of the month and lasting nine days. The celebrations, which were varied each day, consisted of processions between Athens and Eleusis, torch-bearing and mystic ceremonies attended with oaths of secrecy.

Eleusis, in ancient geography, a small city of Attica, opposite the Island of Salamis. Its temple of Demeter was one of the most beautiful buildings of Greece. It has been excavated.

Eleuthera, one of the largest of the Bahama Islands (q.v.). It is of very irregular shape, its length being about 70 miles. Pop. 6533.

Elgar, Sir Edward (1857-), English composer. In 1892 he produced *The Black Knight*, and this was followed by several oratorios, cantatas, and other works, including *The Light of Life*, a short oratorio (Worcester Festival, 1896); *King Olaf*, a cantata (North Staffordshire Festival, 1896); *Imperial March* (1897); *Te Deum* (Hereford Festival, 1897); *Caractacus* (Leeds Festival, 1898); and *Orchestral Variations* (1899). In 1900 his famous sacred cantata, *The Dream of Gerontius*, was produced at the Birmingham Festival. In 1902 the *Coronation Ode* proved extremely popular, and in 1903 the Birmingham Festival introduced *The Apostles*, a fine oratorio. His more recent works include: *Falstaff*, *The Spirit of England*, and *Carillons*. He became a baronet in 1931.

Elgin, James Bruce, eighth Earl of, and twelfth Earl of Kincardine (1811-1863), Governor-General of India. He was appointed Governor-General of Jamaica in 1842, and in 1846 Governor-General of Canada. In 1859 he became Postmaster-General in Palmerston's Cabinet, in 1860 was sent on a special mission to Peking, and in 1861 became Governor-General of India.

Elgin, a royal burgh of Scotland, capital of Morayshire, situated on the Lossie about 5 miles from the Moray Firth. The most interesting edifice is the ruined cathedral, founded in 1224. The industries are woollen manufacture, iron-founding, and tanning. Pop. (1931), 8810.

Elgin, a town of the U.S.A., in Illinois, on Fox River. It has a watch-factory, various flourishing industries, and is the centre of a great dairy-farming district. Pop. 27,454.

Elgin, County of. See *Morayshire*.

Elgin Marbles, the collection of antique sculptures brought chiefly from the Parthenon of Athens to England by the seventh Earl of Elgin (1766-1841) in 1814, and afterwards purchased by Parliament for the British Museum at the cost of £35,000. They consist of figures in low and high relief and in the round, representing gods, goddesses, and heroes; the combats of the Centaurs and Lapithæ; the Panathenaic procession, &c.

El Hasa, a fertile district of Eastern Arabia, on the Persian Gulf. It is independent, and produces dates, wheat, millet, and rice. Area, 31,000 sq. miles; pop. estimated at 175,000.

Elijah, the most distinguished of the prophets of Israel, flourished in the ninth century B.C., during the reigns of Ahab and Ahaziah, and until the beginning of the reign of Jehoram. Elijah at length ascended to heaven in a chariot of fire, Elisha, his successor, being witness.

Eliot, George (1820-1880), the assumed literary name of Mary Ann, or, as she preferred to write the name in later years, Marian Evans, English novelist. Her first literary undertaking was the completion of Mrs. Hennell's translation of Strauss's *Life of Jesus* (1846). It was not, however, until January, 1857, that she came prominently into public notice, when the first of a series of tales entitled *Scenes from Clerical Life* appeared in *Blackwood's Magazine*. In the following year the publication of *Adam Bede* placed her in the first rank of writers of fiction. It was succeeded by *The Mill on the Floss* (1860), *Silas Marner* (1861), *Romola* (1863), *Felix Holt* (1866), *Middlemarch* (1872), and *Daniel Deronda* (1876). In addition to those prose works she published three volumes of poems, *The Spanish Gypsy* (1868), *Agatha* (1869), and *The Legend of Jubal* (1874). Her last work published during her life was the series of essays entitled *The Impressions of Theophrastus Such* (1879), but a volume of mixed essays was issued posthumously. For many years she was happily associated both in life and work with George Henry Lewes, though a legal union was impossible during the lifetime of Mrs. Lewes. In May, 1880, after Lewes's death, she married Mr. John Cross, but did not survive the marriage many months, dying rather suddenly at Chelsea.—BIBLIOGRAPHY: J. W. Cross (editor), *George Eliot's Life as Related in Her Letters and Journals* (3 vols.); Sir Leslie Stephen, *George Eliot* (in *English Men of Letters Series*).

Eliot, Sir John (1592-1632), English statesman. In the three Parliaments of 1623, 1625, 1626, he made his way to the front of the constitutional party, and took a prominent share in drawing up the Remonstrance and Petition of Right. He was imprisoned in the Tower in 1629, and died in confinement. During his imprisonment he wrote a work on constitutional monarchy entitled *The Monarchie of Man*.

Elis, a maritime state of ancient Greece, in the west of the Peloponnesus, watered

by the Rivers Alphæus and Penæus, and now a Greek nomarchy. The Olympic Games were held in Elis.

Elisavetgrad, a town of the Ukraine, on the Ingul, in a very fertile district. It has manufactures of soap and candles. Pop. 75,800.

Elisha, a Hebrew prophet, the disciple and successor of Elijah. He held the office of prophet for fully sixty-five years, from the reign of Ahab to that of Joash (latter half of ninth century B.C.).

Elizabeth (*Carmen Sylva*) (1843-1916), Dowager Queen of Romania. Among her works, which were all, with the exception of one, written in German, are: *The Bard of the Dimbovitza*, *Pilgrim Sorrow*, *A Real Queen's Fairy Tales*, and *From Memory's Shrine*.

Elizabeth (1533-1603), Queen of England, daughter of Henry VIII and of Anne Boleyn. On 17th Nov., 1558, Mary died, and Elizabeth was immediately recognized queen by Parliament. The accuracy of her judgment showed itself in her choice of advisers, Parker, a moderate divine (Archbishop of Canterbury 1559), aiding her in ecclesiastical policy; while William Cecil, Lord Burleigh, assisted her in foreign affairs. The first great object of her reign was the settlement of religion. The ecclesiastical system devised in her father's reign was re-established, the royal supremacy asserted, and the revised Prayer Book enforced by the Act of Uniformity.

Elizabeth entered into a league with the Lords of the Congregation, or leaders of the Reformed party in Scotland; and throughout her reign this party was frequently serviceable in furthering her policy. She also gave early support to the Huguenot party in France, and to the Protestants in the Netherlands, so that throughout Europe she was looked on as the head of the Protestant party. This policy roused the implacable resentment of Philip II of Spain. The detention of Mary Queen of Scots in England (1568-1587), whither she fled to the protection of Elizabeth, led to a series of conspiracies, beginning with that under the Earls of Northumberland and Westmorland, and ending with the plot of Babington, which finally determined Elizabeth to make away with her captive. The execution of Queen Mary (1587), though it has stained her name to posterity, tended to confirm her

power among her contemporaries. Philip of Spain, however, called the Queen of England a murderess, and refused to be satisfied even with the sacrifice she seemed prepared to make of her Dutch allies. The Armada sailed on 29th May, 1588. The war with Spain dragged on till the close of Elizabeth's long reign.

During her reign the splendour of her government at home and abroad was sustained by such men as Burleigh, Bacon, Walsingham, and Throgmorton; but she had personal favourites of less merit who were often more brilliantly rewarded. Chief of these were Dudley, whom she created Earl of Leicester, and whom she was disposed to marry, and Essex, whose violent passions brought about his ruin. He was beheaded in 1601, but Elizabeth never forgave herself his death. Her own health soon after gave way, and she died on 24th March, 1603, naming James VI of Scotland as her successor.—BIBLIOGRAPHY: J. A. Froude, *History of England*; M. Creighton, *Queen Elizabeth*; E. S. Beesley, *Queen Elizabeth*.

Elizabeth, a city of New Jersey, U.S.A. It is a favourite residence of New York business men. The Singer Sewing-machine Company has a large factory here, and there are also foundries and oil-cloth factories. Pop. 95,783.

Elizabethan Architecture, a style of architecture which prevailed in England during the reigns of Elizabeth and James I. The chief characteristics of Elizabethan architecture are: windows of great size both in the plane of the wall and deeply embayed, ceilings very richly decorated in relief, galleries of great length, very tall and highly-decorated chimneys, as well as a profuse use of ornamental strap-work in the parapets, window-heads, &c. The princely houses which arose during the reign of Elizabeth are numerous, and many even yet remain to attest the splendour of the time. Of these may be mentioned Burghley House, Hardwick Hall, and Bramhall Hall. See Plate, *Architecture*, vol. i).

Elizabeth Islands, a group of sixteen American islands south of Cape Cod, with a permanent population of about 150.

Elizabeth Petrovna (1709-1762), Empress of Russia, daughter of Peter the Great and Catherine. She ascended the throne on 7th Dec., 1741. A war with Sweden in 1743 was advantageously

concluded by the Peace of Åbo. In 1748 she sent an army to assist Maria Theresa in the War of the Succession, and joined in the Seven Years' War against Prussia. She died before this war was concluded.

Elizabethpol, a town of Azerbaijan, in the Caucasus, chief town of the government of the same name. It is very unhealthy. The inhabitants cultivate fruit and tobacco and rear silkworms. Pop. 60,000.—The government has an area of 17,000 sq. miles, and a pop. of 636,326. It is partly mountainous, partly steppes, and produces grain, fruits, copper, silk, tobacco, and wine. The inhabitants are mainly Armenians and Tatars.

Elizabeth Stewart (1596-1662), Queen of Bohemia, daughter of James I of England and VI of Scotland. Her marriage with the Palatine Frederick was celebrated



Elizabethan Interior

A reconstruction in the Victoria and Albert Museum, London, of panelling and furniture removed from a house at Bromley by Bow, London.

at Whitehall in 1613. Her husband accepted in 1619 the crown of Bohemia. After his defeat, however, by the Imperialists at the battle of Prague in 1620, he

and his wife were obliged to flee, first to Breslau and Berlin, and then to The Hague.

Elizabethville, a town, Belgian Congo, capital of Katanga province. It is in a district rich in copper and radium.

Elk, Moose, or Moose Deer (*Alces Machlis*), the largest of the deer family, a native of Northern Europe, Asia, and America. The elk or moose has a short compact body, standing about 6 feet in height at the shoulders, a thick neck, large clumsy head, and horns which flatten out almost from the base into a broad palmate form with numerous snags. In colour the elk is greyish-brown. Its flesh

of Warren Hastings in 1785 he acted as leading counsel. After eight years Hastings was acquitted and Law's success assured. In 1801 he was made Attorney-General, and in 1802 became Lord Chief Justice of the King's Bench.

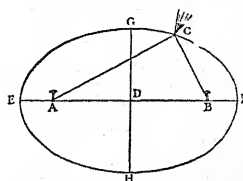
Ellenborough, Edward Law, first Earl of (1790–1871), British statesman. In 1818 he took office as Lord Privy Seal, and was President of the Board of Control from 1828 to 1830, and again in 1834. In 1841 he accepted the governor-generalship of India, and arrived in Calcutta in 1842, in time to bring the Afghan War to a successful issue. The annexation of Scinde in 1843 was followed by the conquest of Gwalior, but the conduct of the Governor-General gave dissatisfaction at home, and he was recalled early in 1844.

Ellice Islands consist of nine groups of coral islands lying north of Fiji and extending about 350 miles. The population of the whole group is about 3500, mainly Polynesians. The islands grow coco-nut palms, and copra and guano are the main exports. They have been a British protectorate since 1892, and now form part of the Gilbert and Ellice Islands Colony. See *Gilbert Islands*.

Ellichpur, a town of India, in Ellichpur district, Berar. There is a cotton industry. Pop. 26,800.

Elliott, Ebenezer (1781–1849), English poet, known as the 'Corn-law Rhymers'. His *Corn-law Rhymes*, periodically contributed to a local paper devoted to the repeal of these laws, attracted attention, and were afterwards collected and published with a longer poem entitled *The Ranter*.

Ellipse, one of the conic sections (q.v.). To describe an ellipse: At a given distance



Ellipse

resembles beef rather than venison. It feeds largely on the shoots of trees or shrubs, such as the willow and maple, and on bark, &c. In Sweden its destruction is illegal, and in Norway there are many restrictions upon the hunting of it.

Elk, Irish (*Megaceros hibernicus*, or *Cervus giganteus*), a large deer found in the Pleistocene strata, and distinguished by its enormous antlers, the tips of which are sometimes 11 feet apart. Its remains are found in Europe, where they occur in bogs, lacustrine deposits, brick-clay, and ossiferous caves.

Elkhart, a town of Indiana, U.S.A., on Elkhart River, with railroad works, paper-mills, flour-mills, and starch-factories. Pop. 24,277.

Elland, a town of England, West Riding of Yorkshire, with manufactures of cottons and woollens, and quarries. Pop. (1931), 10,327.

Ellenborough, Edward Law, Lord (1750–1818), English lawyer. At the trial

on the surface on which the ellipse is to be described fix two pins, A and B, and pass a looped string round them. Keep the string stretched by a pencil, c, and

move the pencil round, keeping the string at the same tension, then the ellipse *egru* will be described. A and B are the foci, D the centre, EF the major axis, GH the minor axis, and the fraction DA/DE the eccentricity of the ellipse.

Ellipsoid, a surface bearing the same sort of relation to a spherical surface as an ellipse bears to a circle. The name is also given to the solid bounded by such a surface. A plane section is an ellipse, but there are two particular directions of the section for which the ellipse reduces to a circle. For ellipsoids of revolution, see *Spheroid*.

Elliptic Functions are generalizations of the circular functions *sine*, *cosine*, &c. The circular functions have the period 2π ; the elliptic functions are doubly periodic, having both a real and a pure imaginary period in the most important case. The functions are needed for the solution of many physical problems, such as those of the motion of a top and of a pendulum.—Cf. Whittaker and Watson, *Modern Analysis*.

Ellis, Alexander John (1814–1890), English philologist. His chief work is *Early English Pronunciation* (in five parts), between 1869 and 1889.

Ellis Island, a small island in the upper New York Bay. It is an immigrant station to which immigrants are sent while their papers are being examined. People awaiting deportation are also sent to Ellis Island. Its administration and the conditions under which the immigrants are forced to live have been the subject of much criticism and inquiry.

Ellora, a ruined village, India, Deccan, Hyderabad, famous for its cave temples excavated in the crescent-shaped scarp of a large plateau. They consist of five Jain caves towards the north, seventeen Brahmanical caves at the centre, and towards the south twelve Buddhist caves. The most magnificent of the whole is the Hindu temple called Kailasa.—Cf. Ferguson and Burgess, *The Cave Temples of India*.

Ellore, a town of India, Godavari district, Madras Presidency, noted for carpets, and having a large trade in grain. Pop. 29,500.

Ellwood, Thomas (1639–1713), English Quaker author. He is said to have suggested to Milton the idea of writing *Paradise Regained*. His works include a poetical life

of King David, the *Davideis*, *Forgery no Christianity*, and an autobiography, *The History of the Life of Thomas Ellwood: written by his own hand*.

Elm, a genus of trees (*Ulmus*; nat. ord. *Ulmaceæ*), consisting of eighteen species, natives of the northern temperate zone and mountains of Tropical Asia. Two species are common in Britain, *Ulmus campestris* and *Ulmus montāna*, with many varieties. The *Ulmus campestris*, or common elm, is a fine tree, of rapid and erect growth, and yielding a tall stem. The average height of a mature tree is 70 or 80 feet. The wood is brown, hard, of fine grain, and not apt to crack. *Ulmus montāna* (the mountain or wych elm), a native of Scotland, is not so tall and of much slower growth, yielding a much shorter bole. It usually attains to the height of about 50 feet. It yields seed freely. The timber is strong and elastic, *Ulmus glabra*, the smooth-leaved elm, is a variety common in some parts of Britain. The most ornamental tree of the genus is *Ulmus montāna*, variety *pendula*, the weeping elm. The American or white elm (*Ulmus americana*) is abundant in the Western States. The red or slippery elm (*Ulmus fulva*) is found in Canada and Missouri. The wahoo (*Ulmus alata*), inhabiting from lat. 37° to Florida, Louisiana, and Arkansas, is a small tree, 30 feet high. See *Plates*, *Leaves* (Vol. iv), and *Trees* (Vol. vi).

Elmina, a British seaport in the Gold Coast Colony, exporting gold-dust, maize, cocoa, and palm-oil. There is good anchorage in 7 fathoms about 1 mile off shore. Pop. 15,000.

Elmira, a town of the U.S.A., in New York, on the Chemung River, with rolling-mills, blast-furnaces, foundries, and machine-works. Pop. 45,303.

Elmshorn, a town in Schleswig-Holstein, on the Krückau, a navigable stream. It has a large shipping trade, and manufactures textiles, beer, and boots. Pop. 14,790.

Elmsley, Peter (1773–1825), English scholar. He published editions of the *Œdipus Tyrannus* (1811), *Heracleidæ* (1815), *Medea* (1818), *Bacchæ* (1821), and *Œdipus Coloneus* (1823).

El Obeid, a town of the Anglo-Egyptian Sudan, terminus of the Kordofan Railway and capital of Kordofan province. Pop. 12,000.

Elobey, Great and Little, two islands in the Gulf of Guinea, belonging to Spain. Great Elobey has an area of $\frac{3}{4}$ sq. mile and a population of 123, while the area of Little Elobey is 22 acres and the population 222.

Eloëa, a genus of submerged water-plants, nat. ord. Hydrocharitaceæ. *E. canadensis*, the Canadian water-weed, was accidentally introduced into Britain about 1840. It is much used for physiological experiments, e.g. for showing the movements of protoplasm.

El Paso, a town of the U.S.A., in Texas, on the Rio Grande del Norte, with extensive railway connexions and large trade with Mexico. It is a health-resort, and trades in copper, lead, and silver. It has foundries, flour-mills, and wood box factories. Pop. 77,560.

Elphinstone, Mountstuart (1778-1859), Indian administrator. In 1819 he became Governor of Bombay. During a government of seven years he established a code of laws, lightened taxes, and paid great attention to schools and public institutions. He was the author of an *Account of the Kingdom of Cabul and its Dependencies* (1815), and a *History of India* (1841).

Elphinstone, William (1481-1514), Scottish prelate. In 1478 he was made commissary of the Lothians, and in 1479 Archdeacon of Argyll. Soon after he was made Bishop of Ross; and in 1483 was transferred to the see of Aberdeen. In 1494 he obtained a Papal Bull for the erection of the University of King's College at Aberdeen.

Elsinore. See *Helsingör*.

Elster, two German rivers, the White or Great Elster, a tributary of the Saale; the Black Elster, a tributary of the Elbe.

Elswick, a suburb of Newcastle, England, containing the great ordnance-works of Armstrong, Whitworth, & Co. Pop. 58,352.

Elvas, a fortified frontier city of Portugal, 12 miles north-west of Badajoz. It has a cathedral and a Moorish aqueduct. It exports brandy, pottery, and fruit, and has a flourishing contraband trade with Spain. Pop. 12,000.

Ely, an episcopal city of England, in the county of Cambridge, on an eminence on the left bank of the Ouse. The ecclesiastical structures comprise the cathedral, one of the largest in England, and the churches of St. Mary and the Holy Trinity.

The last belongs to the time of Edward II, and is one of the most perfect buildings of that age. There are a few manufactures, and most of the inhabitants are engaged in agricultural labour. Pop. (1931), 8382.

Ely, Isle of, a portion of the county of Cambridge, separated by the Ouse from the rest of the county, and forming itself a sort of county. It is about 28 miles long by 25 miles broad; area, 238,073 acres. The soil is very fertile. Pop. (1931), 77,705.

Elyria, a city of Ohio, U.S.A. It trades in building stone, and has chemical, motor-car, and paint factories, besides tanneries and steelworks. Pop. 22,720.

Elysium, or **Elysian Fields**, among the Greeks and Romans, the regions inhabited by the blessed after death. They are placed by Homer at the extremities of the earth, by Plato at the antipodes, and by others in the Fortunate Islands (the Canaries).

Elzevir, or **Elzevier**, the name of a family of publishers and printers, residing at Amsterdam and Leyden, celebrated for the beauty of the editions of various works published by them, principally between 1595 and 1680. Of these the *Livy* and *Tacitus* of 1634, the *Pliny* of 1635, the *Virgil* of 1636, and the *Cicero* of 1642 are perhaps the most beautiful. The Elzevir books are distinguished by the types and the choice of the paper rather than by the critical preparation of their texts.

Emanuel the Great (1469-1521), King of Portugal. He ascended the throne in 1495, and during his reign were performed the voyages of discovery of Vasco da Gama, of Cabral, of Americus Vesputius, and the heroic exploits of Albuquerque. The treasures of America flowed into Lisbon, and the reign of Emanuel was justly called 'the golden age of Portugal'.

Embalming, the process of so treating dead bodies with aromatic and antiseptic substances as to preserve them from corruption and decomposition. For embalming among the ancient Egyptians, see *Mummies*. Of the various modern artificial means of preserving bodies, impregnation with corrosive sublimate appears to be one of the most effective, next to immersion in spirits. An injection of sulphate of zinc into the blood-vessels is also stated to be satisfactory; while natron, various spices, and other aromatic compounds are sometimes employed.

Embankment, a mound of earth, &c.,

thrown up either for the purpose of forming a roadway at a level different from that of the natural surface of the ground, or for keeping a large body of water within certain limits. When constructed wholly of earth or clay, it is triangular in cross-section. The slope of loose rubble, chalk, stone, loamy sand, or gravel requires about $1\frac{1}{2}$ base to 1 vertical; dry, loose, and ordinary clay, 2 horizontal to 1 vertical, while some clays require a much wider base. To prevent subsidence on marshy or peaty soils, reeds or fascines are inserted, or artificial foundations are prepared. In cases where embankments are raised for the storage of water, a 'puddle-dike', that is, a water-tight wall, must be inserted down to the impermeable strata beneath.

Emberizidæ, a family of small perching birds, typical genus *Emberiza*. It includes the buntings, the snow-flake, the yellow-hammer, and reed sparrow. The ortolan belongs to this family. By some naturalists it is classified as a sub-family of the finches.

Embezzlement is the appropriation, by a clerk or servant, to himself, of money or property put into his hands in trust. It is punishable by imprisonment.

Embolism is the obstruction of a blood-vessel by an embolus, the name given to a blood-clot or other body carried by the blood-stream, and obstructing the circulation at the point of lodgment. An embolism in a vital organ gives rise to serious symptoms which may cause death in a short time, or more remotely by the production of gangrene or pyæmia.

Embryology, the branch of biology concerned with the fertilization of the ovum and its development into the adult. In the course of its development an organism repeats the evolution of its group to some extent, thus furnishing a clue to its actual affinities. The subject also throws light on the problems of heredity. Aristotle and Galen made some observations on the subject, as regards animals, while Harvey and his successors considerably advanced our knowledge, but as a distinct and important science embryology only dates from the nineteenth century. Among distinguished cultivators of the science there may be singled out K. E. von Baer, Russian naturalist (1792-1876), and F. M. Balfour (1851-1882), brother of the Earl of Balfour. See *Reproduction*; *Evolution*; *Histo-*

logy.—Cf. F. M. Balfour, *Treatise on Comparative Embryology*.

Emden, a town of Prussia, Hanover, near the mouth of the Ems, occupying a low flat intersected by numerous canals. The harbours admit large vessels, and several canals run inland. There is accommodation for ships of any size, and the floating and dry docks can take up to 20,000 tons. It exports grain, dairy produce, and gin, and has shipbuilding yards, and manufactures hosiery and leather. Pop. 27,000.

Emerald, a variety of beryl, somewhat harder than quartz; specific gravity, 2.67 to 2.73. It is a silicate of aluminium and the rare element glucinum or beryllium, which was detected in it by Vauquelin. Its colour is due to the presence of chromium, of which there may be 0.2 to 0.3 per cent present. Its natural form is either rounded or that of a short six-sided prism. It is one of the softest of the precious stones, but is not acted on by acids. The finest are now obtained from Colombia. The Oriental emerald is a variety of the ruby, of a green colour, and is an extremely rare gem.

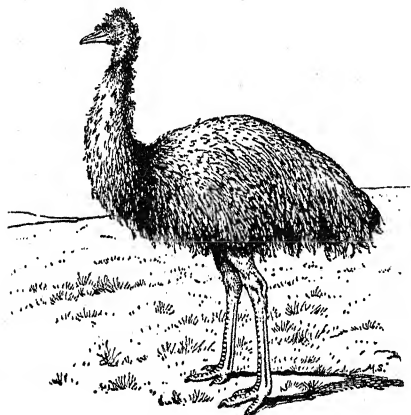
Emerson, Ralph Waldo (1803-1882), American poet and prose writer. He was one of the original editors of *The Dial*, a transcendental magazine begun in 1840. Two volumes of his essays were published in 1841 and 1844, and his poems in 1846. In 1850 he published *Representative Men*; in 1856, *English Traits*; in 1860, *The Conduct of Life*; in 1869, *May Day and Other Poems and Society and Solitude*; in 1871, *Parnassus*, a collection of poems; in 1876, *Letters and Social Aims*. He was not only one of the most original and influential writers that the United States have produced, but also one of the most helpful and influential ethical teachers of the nineteenth century.—**BIBLIOGRAPHY**: R. Garnett, *Life of Ralph Waldo Emerson*; G. S. Woodberry, *Ralph Waldo Emerson*.

Emery, an impure variety of corundum, of blackish or bluish-grey colour. It contains about 82 per cent of alumina, and a small portion of iron; is very hard; is practically infusible, and is not attacked by acids. The best emery is brought from the Levant. It is used in polishing precious stones and marble, and grinding lenses and glass.

Emetic is a substance given to produce vomiting, either acting directly on the

nerves of the stomach, or indirectly through the blood-stream on the vomiting centre in the brain. A solution of common salt, two tablespoonfuls dissolved in half a tumblerful of tepid water, or twenty grains of sulphate of zinc, or one-tenth of a grain of apomorphine hydrochloride given hypodermically are the most reliable.

Emeu, or Emu, a large flightless running bird (*Dromæus novæ-hollandiæ* and *D. irroratus*) found in some parts of Australia. It is allied to the cassowary,



Emeu or Emu (*Dromæus novæ-hollandiæ*)

but is a bird of the plain. It is nearly as big as an ostrich and is a very fast runner. Its wings are small and useless for flight.

Emigration, the movement of individuals or groups from one state or country to a colony or another country, to be distinguished from *migration*, which describes the movement of peoples or races from one geographical area to another, and from *colonization*, which implies the foundation of a new state or extension of the sway of the colonists' state of origin. In Europe up to the seventeenth century emigration was sporadic, notable instances being the movement from Flanders to England in the fourteenth century, and of Protestants from France to England in the sixteenth and seventeenth centuries. In the seventeenth century, with the growth of European colonies in America and the East, there was much emigration to those places, notably from Spain, Portugal, and Great Britain to America, and from the

Netherlands to the East. In the eighteenth century the movement slackened, but in the nineteenth century, largely as the result of the industrial revolution and the decay of agriculture, the great era of emigration began, especially from the United Kingdom. During the nineteenth century the main stream has flowed westward into America from Europe. Particularly important have been the emigration of Irish to the United States, and of Germans to South America. There has also been considerable movement from Russia into the United Kingdom, in many cases as a half-way house to the United States. In the East, emigration from China and Japan to the United States and Australia, and from India to British tropical colonies, has been important. It is noticeable that the Latin and Yellow races as a rule emigrate with the idea of returning ultimately to their native country; with the Anglo-Saxon, Teutonic, and Slav races the aim of a permanent domicile is predominant.—BIBLIOGRAPHY: Mayo-Smith, *Emigration and Immigration*; S. C. Johnson, *History of Emigration from the United Kingdom to North America, 1763-1912*.

Emigrés, a name given more particularly to those persons who left France during the Revolution of 1789. At the head of these emigrants stood the royal princes of Condé, Provence, and Artois. When Napoleon became emperor he granted permission to all but a few of the emigrants to return to their country; but many declined to return until after his downfall.

Emilia, a compartimento of Central Italy, comprising the provinces of Bologna, Ferrara, Forlì, Modena, Parma, Piacenza, Ravenna, and Reggio Emilia. Area, 8537 sq. miles; pop. (1928), 3,168,495.

Emmahaven, a seaport, west coast of Sumatra, about 5 miles from Padang. It exports coal, coffee, damar, tobacco, rubber, &c. There are two commercial jetties, with a depth alongside of from 28 to 30 feet. Pop. 76,138.

Emmen, a town, Netherlands, 30 miles S.S.E. of Groningen. It is a great agricultural centre, and sheep and cattle are reared in the vicinity. Pop. 42,657.

Emmerich, a town, Rhenish Prussia, on the right bank of the Rhine. It carries on an active trade chiefly with Holland. Pop. 13,418.

Emmet, Robert (1778-1803), Irish

rebel. He became a member of the Society of United Irishmen for the establishment of the independence of Ireland. In July, 1803, he was the ringleader in the foolish rebellion in which Lord Kilwarden and others perished. He was arrested a few days afterwards, tried, and executed.

Empedocles (c. 490–430 B.C.), Greek philosopher of Agrigentum, in Sicily. Empedocles held earth, water, fire, air as the four fundamental and indestructible elements from whose union and separation everything that exists is formed. He wrote his philosophy in verse; of his chief work, *On Nature*, about 400 lines out of the original 5000 are preserved.

Emperor, the title of the highest rank of sovereigns. The word *imperator*, from *imperāre*, to command, in its most general sense signified the commander of an army. After the overthrow of the Roman republic *imperator* became the title of the rulers or emperors, and indicated their supreme power. With the fall of Rome the title was lost in the West, but was kept up in the Eastern or Byzantine Empire for nearly ten centuries. In 800 it was renewed in the West by Charlemagne. The imperial dignity became extinct in the East in 1453, but the title was adopted by Peter I of Russia in 1721. Napoleon I and his nephew, Napoleon III, were both styled Emperor. In Dec., 1870, the second German Empire was formed. This empire came to an end in Nov., 1918. Queen Victoria assumed the title of *Empress of India* in 1876.

Emperor Moth (*Saturnia pavonia*), a British moth, belonging to a family Saturniidae, of greyish-brown colour. Its wings are marked by a large eye-like spot in each.

Empetraceæ, a small natural order of heath-like Dicotyledons, of which the type is the crowberry.

Empire Day, a British imperial celebration which is held annually on the 24th of May, the birthday of Queen Victoria. The celebration was officially held for the first time in 1904, and has since gained wide recognition, mainly owing to the unremitting efforts of the twelfth Earl of Meath.

Empiricism, a term applied to any philosophical system which finds all its material in experience. The philosophy of empiricism was developed by Hobbes, Locke, Hume, and J. S. Mill. It is akin to sensualism, which maintains that all

knowledge comes from sense experience alone.—**BIBLIOGRAPHY**: T. H. Green, *Prolegomena to Ethics*; W. James, *Essays in Radical Empiricism*.

Employers' Liability Act. Before 1880 a master was not liable to pay compensation for injuries to his servants, but with the passing of the Workmen's Compensation Act of that year he became liable in certain cases, as when the injury was incurred by a servant acting under his master's orders. The scope of compensation was widened by the additional Acts of 1897 and 1900, and a further Act in 1906 brought within its limit domestic servants and practically all employees whose incomes were under £250 per annum, except soldiers, sailors, policemen, and members of the employer's own family. Compensation is given for disablement by accident, for disease arising out of employment, and in the case of fatal injuries, to the dependents. The Insurance Act does not take away liability from the employer, but the compensation given to the employee will be taken into account when sickness benefit under the Act is claimed.

Employment Bureaus were first established on a considerable scale in the United Kingdom by the Labour Exchanges Act, 1909. Their chief object was to put employers and work-people into touch with a view to employment. The 1909 Act gave the Board of Trade power to establish labour exchanges; and, by regulations under the Act, the United Kingdom has been divided into divisions in each of which are a number of exchanges of different grades. The system is industrial and not eleemosynary, aiming solely at providing a recognized market-place for labour. No fees are charged, and use of the exchanges is voluntary. An important part of the work of the labour exchange is in connexion with Unemployed Insurance, under Part II, National Insurance Act, 1911. This provided for payment of unemployed benefit in a limited number of occupations. Subsequent Acts (notably that of 1920) have extended the system to cover the majority of occupations. The scheme is contributory, but the State shares the cost with employers and work-people.

Empoli, a town in North Italy, on the Arno. It has manufactures of straw-bonnets. Pop. 21,500.

Emporia, a town of the U.S.A., in

Kansas, with a good trade in grain and cattle. Pop. 11,000.

Ems, a watering-place in the Prussian province of Hesse-Nassau, on the River Lahn, not far from its confluence with the Rhine. There are about 8000 visitors each season. Pop. 6850.

Ems, a river of North-West Germany, which falls into the Dollart estuary near Emden; length 230 miles.

Emu. See *Emeu*.

Enamel, a vitreous glaze coloured with metallic oxides, and, when first introduced, made to adhere by fusion on metals, &c. The ancient enamels are more or less opaque. Transparent enamels were favoured in the thirteenth century by Italian goldsmiths. A favourite method of applying enamel is known as *cloisonné*, which means inlaid between partitions. The design is outlined in bent-wire fillets, which are fastened to the plate by means of silver solder or the enamel itself. In *champlevé* work the plate itself is scooped out into channels for the enamel. Enamelled glass is really deeply coloured glass. Bicycle enamel is made of asphalt or resin dissolved in oil, each coat being hardened by heat. Enamel paint is made by mixing copal varnish, &c., with metallic oxides. A special preparation is applied to leather which is afterwards heated—this is 'patent leather'. Enamel painting dates back to the sixteenth century, and is used nowadays chiefly for street signs and advertisements.—**BIBLIOGRAPHY**: H. Cunynghame, *Art of Enamelling*; A. Fisher, *The Art of Enamelling upon Metal*.

Enara, a lake in the north of Finland, about 50 miles long by 30 miles broad. It is studded by innumerable islets, and abounds with fish.

Enarea, a region belonging to the country of the Gallas, south of Abyssinia. Sakha is the principal town. Coffee and ivory are the chief exports.

Encarnación, a department of South-East Paraguay. It is one of the most fertile and best-cultivated areas in the republic, being watered by the Parana and its tributaries. Great quantities of fruit are produced.—*Encarnación*, the capital, is on the Parana, and has a good harbour much used by river steamers. Pop. 12,500.

Encaustic Painting, a kind of painting practised by the ancients, for the perfecting of which heating or burning-in was required. Pliny distinguishes three species,

in all of which wax was used with colours, and applied either with bronze instruments (cauteria), a sharp-pointed tool (cestrum), or brushes. The art has been revived in modern times, but has not been greatly employed.

Encaustic Tiles, ornamental paving-tiles of baked pottery, much used during the Middle Ages in the pavements of churches and other ecclesiastical buildings. The encaustic tile, strictly so-called, was decorated with patterns formed by different coloured clays inlaid in the tile and fired with it. The art appears to have originated in the latter part of the twelfth century, to have attained its highest perfection during the thirteenth, and to have sunk into disuse in the fifteenth.

Encephalitis Lethargica, an epidemic disease of the central nervous system which appeared in Austria in 1917 and spread slowly westwards, reaching America in 1919. It may have been this disease which caused epidemics in 1712–1713, 1846, and in 1889–1890. It is characterized by fever usually mild, headache, lethargy which may alternate with insomnia, and various forms of paralysis, particularly of the muscles of the eye. Death usually takes place within three weeks of the onset. The mortality is about 25 per cent. In cases of recovery disturbance of the mental functions may be prolonged, but is seldom permanent.

Enchanter's Nightshade, a name common to plants of the genus *Circæa*, nat. ord. Onagraceæ, of which there are two British species, *C. hutchinsoniana* and *C. alpina*. They have no affinity with the nightshades.

Encke, Johann Franz (1791–1865), German astronomer. He calculated the orbit of the comet observed by Mechain, Miss Herschel, and Pons, predicted its return, and detected a gradual acceleration of movement, ascribed by him to the presence of a resisting medium. The comet is now known as Encke's comet. See *Comet*.

Encrinite. See *Crinoidea*.

Encyclical, a sort of circular letter or manifesto issued by a Pope, and directed to the Roman Catholic clergy generally or to those of a certain country or area, giving instructions as to conduct to be observed at certain conjunctures, condemning erroneous doctrines, &c. The encyclical is a somewhat less formal document than a bull.

Encyclopedia, a systematic view of the whole extent of human knowledge or of

particular departments of it, with the subjects arranged generally in alphabetic order. Varro and Pliny the elder, among the Romans, attempted works of an encyclopedic nature. Other ancient encyclopedic works were those of Stobæus and Suidas, and especially of Marcianus Capella. In the thirteenth century an encyclopedia was compiled by the Dominican Vincent of Beauvais (died 1264). Roger Bacon's *Opus Majus* also belonged to the encyclopedic class. In 1674 appeared the first edition of Moreri's *Le Grand Dictionnaire Historique*; in 1677 Johann Jacob Hoffmann published at Basle his *Lexicon Universale*; and in 1697 appeared Bayle's famous *Dictionnaire Historique et Critique*, which is still of value. Among the chief English works of this kind are: (1) Ephraim Chambers's *Cyclopædia* (1728); (2) *The Encyclopædia Britannica*, in fourteen editions, the first in 1788 and the fourteenth in 1929; (3) Rees's *Cyclopædia* (1802–1820); (4) *Edinburgh Encyclopædia* (1810–1830); (5) *Encyclopædia Metropolitana*; (6) *The London Encyclopædia* (1829); (7) *The Penny Cyclopædia* (1833–1843); (8) Chambers's *Encyclopædia* (last issue 1923); (9) *The Popular Encyclopædia* (last issue 1904); (10) Harmsworth's *Universal Encyclopædia* (1920); (11) Nelson's *The New Age Encyclopædia* (1920); (12) *The New Gresham Encyclopædia* (1921–1924). The chief American encyclopædias are the *New American Cyclopædia*, and *The New International Encyclopædia*. Of the French cyclopædias the most famous is the great *Dictionnaire Encyclopédique*, by Diderot and D'Alembert (see next article); the excellent *Grande Encyclopédie*; and the large and valuable *Grand Dictionnaire Universel du XIX^e Siècle*, published by Larousse. Numerous works of this kind have been published in Germany, the most popular being the *Conversations-Lexikon* of Brockhaus, Meyer's *Konversations-Lexikon*, Pierer's *Konversations-Lexikon*, and that issued by Spamer.

Encyclopédie, The French, originated in a French translation of Ephraim Chambers's *Cyclopædia*. Diderot was appointed to edit it, and enlisted the ablest men of the time as contributors, including D'Alembert (who wrote the famous *Discours préliminaire*), Rousseau, Daubenton, the Abbé Yvon, Toussaint, Buffon, Montesquieu, Voltaire, Euler, Marmontel, D'Holbach, Turgot, Grimm, and Condorcet.

Enderby Land, an island in the Antarctic Ocean, long. 50° E., crossed by the Antarctic Circle.

Endogenous Structures, in botany, are those which arise in the interior of the parent organ. Lateral roots furnish the best example. Opposed to exogenous structures.

Endymion, in Greek mythology, a huntsman whom Selēnē or Diana (the moon) conveyed to Mount Latmos in Caria, and threw into a perpetual sleep in order that she might enjoy his society whenever she pleased.

Energy, Physical, is the capacity which a body or system of bodies has for doing work. Work is done when a force is overcome, and it is measured by the product of the force and the distance through which it is overcome. A quantity of energy is therefore expressed in terms of the same units as work, e.g. the foot-pound and the erg. Energy exists in two forms. Potential energy is that which a body possesses in virtue of its position. For instance, by winding up a clock weight it is given a certain amount of potential energy, which it slowly expends in driving the clock; a bent spring and a mass of compressed air also possess energy in the potential form. Kinetic energy is possessed by bodies in virtue of their motion. Thus a moving bullet and a falling hammer contain kinetic energy; bodies which are in a state of vibration are also sources of this form of energy. Energy may thus exist in any of the following forms: mechanical (potential, kinetic), sound, heat, light, magnetic, electrostatic, electro-magnetic, chemical.

Energy may be transformed from one kind into another. When a pendulum is vibrating, there is a continual transformation of potential into kinetic energy, and vice versa. By rubbing the hands together we convert mechanical energy into heat. In an electric tramway system we may note a whole series of transformations. The chemical energy of the fuel is turned into heat in the furnace and boiler; this, again, into kinetic energy of the turbine and dynamo; the latter gives out electric current, the energy of which, after suffering slight losses as heat in the overhead wire, and as light and sound in the spark at the trolley, passes into the motor, to reappear as kinetic energy of the car.

The transformation of energy takes place according to a definite law. The principle of the *conservation of energy* states that

energy cannot be destroyed, and that when a certain amount of energy disappears, an equal amount appears in another form. The experiments of Rumford, Davy, and Joule were instrumental in establishing the equivalence of mechanical energy and heat. Joule measured the amount of mechanical work which is spent in producing one unit of heat. This is known as the mechanical equivalent of heat, or Joule's equivalent. Joule calculated that 772 foot-pounds of work were expended in raising 1 lb. of water 1° F. The experiment has been repeated in various forms, and the value now accepted for Joule's equivalent is 778.

Although energy cannot be destroyed, nor, it may be added, created, it may be rendered less available for use. The various forms of energy may be classified according to their *availability*, and in this respect mechanical energy is one of the most available, and low-temperature heat is one of the least available. When energy is converted from a more available to a less available form, it is said to be *dissipated* or *degraded*.

The problem of economizing our stores of energy is one which is attracting attention. With the greater scarcity of coal, and the future prospect of its complete absence, other natural sources of energy are being investigated. Waterfalls have long been employed for driving mills wherever this type of power could be obtained cheaply and conveniently. At Kinlochleven, where the valley has been dammed across to obtain sufficient water-power, an aluminium industry has sprung up. There is a scheme on foot at the present time to make use of the tidal energy of the Severn.

Enfantin, Barthélemy Prosper (1796-1864), French social reformer. In 1825 he became acquainted with St. Simon, who in dying confided to him the task of continuing his work. Enfantin organized model communities, which quickly fell to pieces; the new organ of the sect, *Le Globe*, was a failure; their convent at Ménilmontant, of which Enfantin was 'supreme father', was broken up by the Government (1832). He himself was imprisoned as an offender against public morality (being an advocate of free love), and on his release attempted to found a model colony in Egypt, which was broken up in the second year.

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Enfield, a town, England, county Middlesex. It is the seat of the Government manufactory of rifles and small-arms. Pop. (1931), 67,869.

Engadine, a beautiful valley in Switzerland, in the Grisons, on the banks of the Inn, bordering on the Tirol, about 50 miles long, but in some parts very narrow, divided into Upper and Lower. The population of the whole valley amounts to about 12,000. The language generally spoken is the Ladin, a branch of the Romanic tongue. The cold, dry climate and mineral springs have made the valley a favourite resort for invalids.

Enghien, Louis Antoine Henri de Bourbon, Duc d' (1772-1804), son of Louis Henry Joseph Condé, Duke of Bourbon. He was generally looked upon as the leader of the *émigrés* (q.v.), and was suspected by the Bonapartists of complicity in the attempt of Cadoudal to assassinate the first consul. An armed force was sent to seize him in Baden in violation of all territorial rights, and he was brought to Vincennes and shot after a mock trial. It was this event which drew from Fouché the comment, since become proverbial: "C'est plus qu'un crime, c'est une faute" ("It is worse than a crime, it is a blunder").

Engine. See *Internal Combustion Engines*; *Steam-engines*.

Engineering, the profession concerned in applying the forces of nature to the service of man. It is sometimes divided into two groups, civil engineering and military engineering. This grouping of the profession of engineering is adopted in the Charter of the Institution of Civil Engineers. Army engineers are organized as Royal Engineers. Candidates intending to become Royal Engineer officers have to pass the Army Entrance Examination to gain admission to Woolwich. Naval engineers enter the service as naval cadets. The engineering lieutenants undergo a special course of engineering training at the Royal Naval College, Greenwich, and then go to sea.

In the ordinary use of the term, *civil engineering* is the name given to one of the sections into which the whole group is divided. The 'civil' engineer undertakes the design and erection of constructional works, such as harbours, docks, railways, buildings, bridges, &c. The other departments of the group of 'civil engineers'

—as distinct from military engineers—are mechanical engineers, electrical engineers, motor engineers, telegraph engineers, radio engineers, mining engineers, aeronautical engineers, &c. With the exception of mining, the courses of training in these sections are very much the same, and consist of a technical course in a college or a university, followed by a practical training as a pupil in a works or office. In mining, the orthodox training consists of a technical course in one of the mining schools, followed by practical work in a mine. In this country every mining engineer who intends to take a position of responsibility must qualify by passing a Board of Trade examination. Sea-going marine engineering officers have, in addition to undergoing the usual training, to pass the sea-going engineers' examination of the Board of Trade.

Engineers, Royal. In 1716 a separate body of engineers was formed, but without military rank, and it was not till 1782 that military titles were conferred on the officers of engineers. In 1787 the Corps of Engineers became by Royal Warrant the Corps of Royal Engineers. For a considerable period the rank and file of the corps were known as the 'Royal Sappers and Pioneers', and the term 'Sapper' is still used to denote a private of the corps. For war purposes the corps is organized into mobile units known as field squadrons and companies for general field-work, and into more highly specialized units for mining, heavy bridging, and railway work.

England, including *Wales*, the southern and larger portion of the Island of Great Britain. On the north it is bounded by Scotland; on all other sides it is washed by the sea: on the east by the North Sea, on the south by the English Channel, and on the west by St. George's Channel and the Irish Sea. The coast-line measures 2765 miles. The following table gives the area and population of England in 1931:

	Square Miles.	Acres.	Population.
England ..	50,327	32,209,112	37,354,917
Wales ..	8,017	5,130,103	2,593,014
Isle of Man ..	227	145,325	49,338
Channel Islands	75	48,083	93,061
	58,646	37,532,623	40,090,330

There are now 'administrative counties' and 'registration counties', differing in area from the old counties; London being now a county.

The capital of England and of the British Empire is London. The cities next in size (in order of population at 1931 census) are: Birmingham, Liverpool, Manchester, Sheffield, Leeds, Bristol, Hull, Bradford, and West Ham. The table on p. 387 gives the area and population statistics of the English and Welsh counties at the 1931 census.

Physical Features.—The chief indentations are: on the east, the Humber, the Wash, and the Thames estuary; on the west, the Solway Firth, Morecambe Bay, Cardigan Bay, and the Bristol Channel; those on the south are less prominent, though including some useful harbours. The greater part of the coast consists of cliffs, in some places clayey, in others rocky, and sometimes jutting out, as at Whitby and Flamborough Head on the east, Beachy Head, the Isle of Portland, the Lizard, and Land's End on the south and south-west, St. David's Head and St. Bees Head on the west, into bold, lofty, and precipitous headlands. The most extensive stretches of flat coast are on the east, in the county of Lincoln, and from the southern part of Suffolk to the South Foreland in Kent, and in Sussex and Hants on the south coast. The chief islands are: Holy Island, the Farne Islands, Sheppey, and Thanet on the east coast; the Isle of Wight on the south; the Scilly Isles at the south-west extremity; and Lundy, Anglesey, Holy Island, and Walney on the west.

The loftiest heights of England and Wales are situated at no great distance from its western shores, and consist not so much of a continuous chain as of a succession of mountains and hills stretching, with some interruptions, from north to south, and throwing out numerous branches on both sides, but particularly to the west, where all the culminating summits are found. The northern portion of this range has received the name of the Pennine chain. It is properly a continuation of the Cheviot Hills, and, commencing at the Scottish border, proceeds south for about 270 miles till, in the counties of Derby and Stafford, it assumes the form of an elevated moorland plateau. In Derbyshire The Peak rises to the

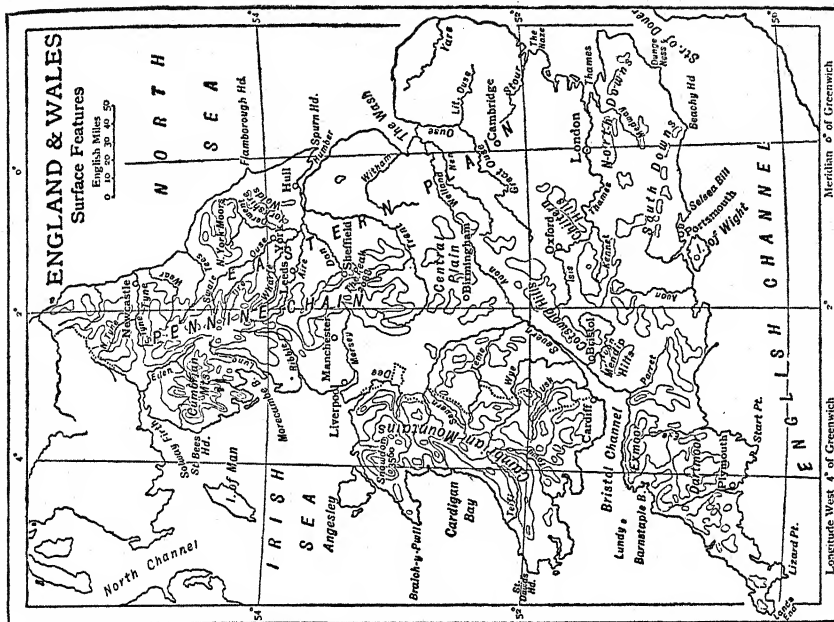
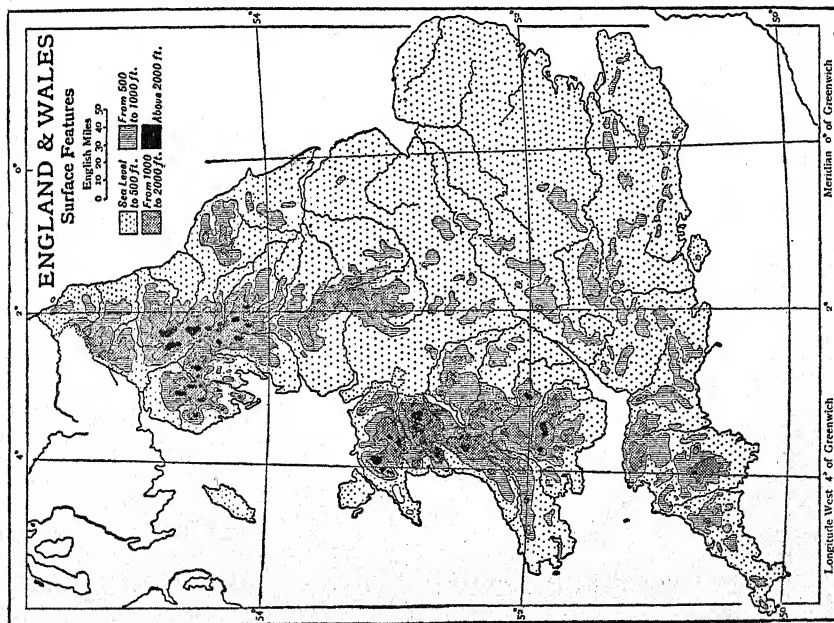
Counties.	Area in Statute Acres, 1931 (Land and Inland Water). Counties, including County Boroughs.	Census Population. Counties, including County Boroughs, 1921.	Census Population. Counties, including County Boroughs, 1931.
ENGLAND.			
Bedfordshire	302,942	206,462	220,474
Berkshire	403,830	204,821	311,334
Buckinghamshire	479,360	236,171	271,565
Cambridgeshire	315,168	129,602	140,004
Isle of Ely	238,073	73,817	77,705
Cheshire	652,383	1,020,257	1,087,544
Cornwall	868,167	320,705	317,951
Cumberland	973,086	273,173	262,897
Derbyshire	647,824	714,634	757,332
Devonshire	1,671,364	709,614	732,869
Dorsetshire	622,843	224,731	239,347
Durham	649,420	1,479,033	1,485,078
Essex	977,764	1,470,257	1,755,240
Gloucestershire	804,638	756,574	785,656
Herefordshire	538,924	113,189	111,755
Hertfordshire	404,520	333,195	401,159
Huntingdonshire	233,985	54,741	56,204
Kent	975,965	1,141,666	1,218,565
Lancashire	1,200,122	4,932,951	5,039,097
Leicestershire	532,779	494,469	541,794
Lincolnshire			
The parts of Holland	268,902	85,870	92,313
The parts of Kesteven	403,505	107,634	110,059
The parts of Lindsey	972,706	408,698	422,181
London	74,850	4,484,523	4,396,821
Middlesex	148,691	1,253,002	1,638,521
Norfolk	1,315,064	504,293	504,846
Northamptonshire	585,148	302,404	309,428
The Soke of Peterborough	53,464	46,959	51,845
Northumberland	1,201,978	746,096	756,723
Northamptonshire	540,015	641,149	712,681
Oxfordshire	479,224	189,615	209,599
Rutlandshire	97,273	18,376	17,397
Shropshire	801,800	243,662	244,162
Somersetshire	1,036,818	405,691	475,120
Southampton	961,665	913,681	1,014,115
Isle of Wight	94,146	94,666	88,400
Staffordshire	737,886	1,353,511	1,431,175
Suffolk, East	557,353	291,073	294,977
Suffolk, West	390,916	108,085	106,137
Surrey	401,833	930,086	1,180,810
Sussex, East	530,555	532,187	546,942
Sussex, West	491,916	195,810	223,136
Warwickshire	624,676	1,394,741	1,534,782
Westmorland	304,617	65,746	65,368
Wiltshire	860,820	291,838	303,258
Worcestershire	447,678	397,910	420,156
York, City of	3,730	84,839	84,810
Yorkshire, East Riding	750,115	460,880	483,058
" North Riding	1,362,058	450,436	469,389
" West Riding	1,776,064	3,181,202	3,352,208
Totals	32,209,112	35,239,225	37,354,917
WALES.			
Anglesey	176,694	51,744	49,025
Brecknockshire	469,281	61,222	57,771
Caernarvonshire	364,108	128,183	120,810
Cardiganshire	443,189	60,881	55,164
Cardiganshire	588,472	175,073	179,063
Denbighshire	427,977	157,634	157,645
Flintshire	163,707	106,617	112,849
Glamorganshire	520,456	1,252,481	1,225,713
Merionethshire	422,372	45,087	43,198
Monmouthshire	349,569	450,794	434,821
Montgomeryshire	510,110	51,263	48,462
Pembrokeshire	393,003	91,978	87,179
Radnorshire	301,165	23,517	21,314
Totals, Wales	5,130,103	2,656,474	2,593,014
Totals, England and Wales	37,339,215	37,886,699	39,947,931

height of 2080 feet. By far the most important of its offshoots are those of the west, more especially if we include in them the lofty mountain masses in North-Western England sometimes classed separately as the Cumbrian range. Amidst these mountains lie the celebrated English lakes, of which the most important are Windermere, Derwent Water, Conistone Lake, and Ullswater. Here also is the highest summit of Northern England, Scawfell (3210 feet). The Pennine chain, with its appended Cumbrian range, is succeeded by one which surpasses both these in loftiness and extent, but has its great nucleus much farther to the west, where it covers the greater part of Wales, deriving from this its name, the Cambrian range. Its principal ridge stretches through Carnarvonshire from N.N.E. to S.S.W., with Snowdon (3571 feet) as the culminating point of South Britain. Across the Bristol Channel from Wales is the Devonian range. It may be considered as commencing in the Mendip Hills of Somerset and terminating at Land's End. The wild and desolate tract of Dartmoor forms one of its most remarkable features (highest summit, Yes Tor, 2050 feet). Other ranges are the Cotswold Hills, proceeding in a north-easterly direction from near the Mendip Hills; the Chiltern Hills, taking a similar direction farther to the east; and the North and South Downs, running eastward.

A large part of the surface of England consists of wide valleys and plains. Beginning in the north, the first valleys on the east side are those of the Coquet, Tyne, and Tees; on the west the beautiful valley of the Eden, which, at first hemmed in between the Cumbrian range and Pennine chain, gradually widens out into a plain of about 470 sq. miles, with the town of Carlisle in its centre. The most important of the northern plains is the Vale of York, which has an area of nearly 1000 sq. miles. Properly speaking, it is still the same plain which stretches, with scarcely a single interruption, across the counties of Lincoln, Suffolk, and Essex to the mouth of the Thames, and to a considerable distance inland, comprising the Central Plain and the region of the Fens. On the west side of the island, in South Lancashire and Cheshire, is the fertile Cheshire Plain. In Wales there are no extensive plains, the valleys generally

having a narrow rugged form favourable to romantic beauty, but not compatible with great fertility. Wales, however, by giving rise to the Severn, can justly claim part in the vale, or series of vales, along which it pursues its course. South-east of the Cotswold Hills is Salisbury Plain, which is really a large elevated plateau, of an oval shape, with a thin chalky soil only suitable for pasture. In the south-west are the vales of Taunton in Somerset and Exeter in Devon. A large portion of the south-east may be regarded as a continuous plain, consisting of what are called the Wealds of Sussex, Surrey, and Kent, between the North and South Downs, and containing an area of about 1000 sq. miles. The south-east angle of this district is occupied by the Romney Marsh, an extensive level tract composed for the most part of a rich marine deposit. Extensive tracts of a similar nature are situated on the east coast, in Yorkshire and Lincoln, where they are washed by the Humber; and in the counties which either border the Wash, or, like Northampton, Bedford, Huntingdon, and Cambridge, send their drainage into it by the Nene and the Ouse. Many of these lands are naturally the richest in the kingdom, but have been utilized only by means of drainage.

Most of the English rivers flow to the North Sea. Four principal river basins may be distinguished, those of the Thames, Wash, and Humber belonging to the North Sea, and the Severn belonging to the Atlantic. The basin of the Thames has an area of 6160 sq. miles, and the river is 215 miles long. The basin of the Wash consists of the subordinate basins of the Great Ouse, Nene, Welland, and Witham, which all empty themselves into that estuary, and has an area computed at 5850 sq. miles. The basin of the Severn consists of two distinct portions, that on the right bank, of an irregularly oval shape, and having for its principal tributaries the Teme and the Wye; and that on the left, of which the Upper Avon is the principal tributary stream. The area of the whole basin is 5850 sq. miles. The basin of the Humber consists of the three basins of the Humber proper, the Ouse, and the Trent, and its area is 9550 sq. miles, being about one-sixth of the whole area of England and Wales. Other rivers unconnected with these



systems are the Tyne, Wear, and Tees in the north-east; the Eden, Ribble, Mersey, and Dee in the north-west. The south-coast streams are very unimportant except for their estuaries. The principal lakes are those of the Cumbrian Mountain Lake District. The table on p. 391 gives a brief summary of the principal industries and the localities where they are centred.

For all other information regarding England see *Britain, Great*; articles on counties, towns, rivers, &c.; and such articles as *Cotton*.

Civil History.—The history of England proper begins when it ceased to be a Roman possession (see *Britain*). On the withdrawal of the Roman forces, about the beginning of the fifth century A.D., the South Britons, or inhabitants of what is now called England, were no longer able to withstand the attacks of their ferocious northern neighbours, the Scots and Picts. In their distress they appear to have sought the aid of the Saxons; and according to the Anglo-Saxon narratives three ships, containing 1600 men, were dispatched to their help under the command of the brothers Hengist and Horsa. Marching against the northern foe, they obtained a complete victory. The date assigned to these events by the later Anglo-Saxon chronicles is A.D. 449. The Saxons, finding the land desirable, turned their arms against the Britons, and, reinforced by new bands, conquered first Kent and ultimately the larger part of the island. These Teutonic invaders were Low German tribes from the country about the mouths of the Elbe and the Weser, the three most prominent being the Angles, the Saxons, and the Jutes. Of these the Jutes were the first to form a settlement, taking possession of part of Kent and the Isle of Wight; but the larger conquests of the Saxons in the south and the Angles in the north gave to these tribes the leading place in the kingdom. The struggle continued 150 years, and at the end of that period the whole southern part of Britain, with the exception of Strathclyde, Wales, and West Wales (Cornwall), was in the hands of the Teutonic tribes. This conquered territory was divided among a number of small states or petty chieftaincies, seven of the most conspicuous of which are often spoken of as the *Hep-tarchy*. Each state was, in its turn,

annexed to more powerful neighbours; and at length, in 827, Egbert, King of Wessex, united in his own person the sovereignty of what had formerly been seven kingdoms, and the whole came to be called England, that is, Angle-land. Before the close of the sixth century Christianity had secured a footing in the south-east of the island. Ethelberht, King of Kent and suzerain over the kingdoms south of the Humber, married a Christian wife, Bertha, and this event indirectly led to the coming of St. Augustine. The kingdom was kept in a state of disturbance by the attacks of the Danes, who had made repeated incursions during the whole of the Saxon period, and about half a century after the unification of the kingdom became for the moment masters of nearly the whole of England. But the genius of Alfred the Great, who had ascended the throne in 871, speedily reversed matters by the defeat of the Danes at Ethandune (878). Guthrum, their king, embraced Christianity, became the vassal of the Saxon king, and retired to a strip of land on the east coast including Northumbria and called the Danelagh. The two immediate successors of Alfred, Edward (901–925) and Athelstan (925–940), the son and the grandson of Alfred, both vigorous and able rulers, had each in turn to direct his arms against these settlers of the Danelagh. The reigns of the next five kings, Edmund, Edred, Edwy, Edgar, and Edward the Martyr, are chiefly remarkable on account of the conspicuous place occupied in them by Dunstan. Ethelred (978–1016), who succeeded Edward, was a minor, the government was feebly conducted, and no united action being taken against the Danes, their incursions became more frequent and destructive. A general massacre of the Danes took place in 1002. The following year Sweyn invaded the kingdom with a powerful army and assumed the crown of England. Ethelred was compelled to take refuge in Normandy; and though he afterwards returned, he found in Canute an adversary no less formidable than Sweyn. Ethelred left his kingdom in 1016 to his son Edmund, who displayed great valour, but was compelled to divide his kingdom with Canute; and when he was assassinated in 1017 the Danes succeeded to the sovereignty of the whole. Canute (Knut), who espoused the widow of Ethel-

Industry.	Sections.	Main Centres.
Fishing.		E. Grimsby, Lowestoft, Yarmouth; S. Plymouth; W. Fleetwood.
Farming.	Crops.	<i>Wheat</i> , mainly south and east; <i>Oats</i> , mainly north; <i>Barley</i> , east and centre; <i>Turnips</i> , all over; <i>Hops</i> , Kent and Surrey; <i>Fruits</i> , south.
	Dairy.	Cheshire, Wilts, Derby, Leicester, Cornwall, Devon.
	Cattle.	West generally and as above.
	Sheep.	Kent, Wilts, Dorset, Lincoln, E. Riding, Shropshire, Hereford, Cumberland, Northumberland.
Mining.	Coal.	Northumberland and Durham, York, Derby, Lancashire, N. Wales, S. Wales, Staffordshire, Cumberland, Shropshire.
	Metals.	<i>Iron</i> , Cleveland (N.E. Yorks), Cumberland, Staffs, Leicester, Lincoln, Northampton; <i>Copper</i> , Cornwall, Devon, Anglesey, Carnarvon; <i>Tin</i> , Cornwall; <i>Lead</i> , Flint, Durham, Derby, Westmorland.
	Other minerals and quarrying.	<i>Salt</i> , Cheshire, Durham, Staffs, Worcester, York; <i>Slate</i> , N. Wales, Cornwall, Cumberland; <i>Limestone</i> , Portland, Devon, Cotswolds, and iron districts; <i>Marble</i> , Derby, Devon; <i>China clay</i> , Cornwall, Dorset.
Smelting.	Iron.	Cleveland, Durham, S. Staffs, N. Lancs, Cumberland, Midlands, S. Wales.
	Other Metals.	<i>Copper</i> , <i>Tin</i> , <i>Lead</i> , <i>Zinc</i> , at Swansea.
	Steel-making.	Sheffield, Newcastle, Darlington, Barrow, Swansea, Middlesbrough.
Manufactures.	Metal goods and Engineering.	<i>Cutlery</i> , Sheffield; <i>Machinery</i> , London, Birmingham, Manchester, Leeds; <i>Needles</i> , Redditch; <i>Timware</i> , S. Wales; <i>Brassware</i> , Birmingham, Sheffield; <i>Steel goods</i> , Smelting areas; <i>Nails</i> , Dudley; <i>Railway Engines</i> , Derby, Crewe, Darlington, Newcastle, Doncaster; <i>Shipbuilding</i> , Newcastle, Jarrow-on-Tyne, Sunderland, London, Birkenhead, and at Royal Dockyards.
	Clothing, &c.	<i>Cottons</i> , Manchester, Lancashire, and N.E. Cheshire; <i>Woollens</i> , Leeds, Bradford, W. Riding, Rochdale, Welshpool (for flannels); <i>Linen</i> , Leeds, Preston; <i>Silk</i> , Coventry, Derby; <i>Lace</i> , Nottingham; <i>Carpets</i> , Kidderminster, Wilton, Halifax; <i>Hosiery</i> , Nottingham; <i>Tanning</i> , Bristol; <i>Boots and Shoes</i> , Northampton, Leicester, Norwich.
	Food.	<i>Sugar</i> , London, Liverpool; <i>Biscuits</i> , Reading; <i>Brewing</i> , Burton-on-Trent.
	Miscellaneous.	<i>Pottery</i> , The Potteries (Stoke-on-Trent), Worcester, Derby; <i>Oils</i> , Hull, Liverpool, London; <i>Chemicals</i> , Swansea, Newcastle, Widnes; <i>Glass</i> , Newcastle, St. Helen's.
Commerce.	Ports.	London, Liverpool, Manchester, Bristol, Hull, Southampton, Newcastle, Portsmouth, Cardiff, Swansea, Harlepool.

red, that he might reconcile his new subjects, obtained the name of Great, not only on account of his personal qualities, but from the extent of his dominions, being master of Denmark and Norway as well as England. In 1035 he died, and was followed in England by two other Danish kings, Harold and Hardicanute, whose joint reigns lasted till 1042, after which the English line was again restored in the person of Edward the Confessor. Edward was a weak prince, and in the latter years of his reign had far less real power than his brother-in-law Harold, son of the great Earl Godwin. On Edward's death in 1066 Harold accordingly obtained the crown. He found, however, a formidable opponent in the second-cousin of Edward, William of Normandy, who instigated the Danes to invade the northern counties, while he, with 60,000 men, landed in the south. Harold vanquished the Danes, and hastening southwards met the Normans near Hastings, at Senlac, afterwards called Battle. Harold and his two brothers fell (14th Oct., 1066), and William immediately claimed the government as lawful King of England, being subsequently known as William I, the Conqueror. At his death, in 1087, William II, commonly known by the name of Rufus, the Conqueror's second son, obtained the crown. In 1100 William II was accidentally killed in the New Forest, and was succeeded by Henry I. In 1135 he died in Normandy, leaving behind him only a daughter, Matilda. The succession was long disputed between her and Stephen, a grandson of William the Conqueror. After years of civil war and bloodshed an amicable arrangement was brought about, by which it was agreed that Stephen should continue to reign during the remainder of his life, but that he should be succeeded by Henry, son of Matilda and the Count of Anjou. Stephen died in 1154, and Henry Plantagenet ascended the throne with the title of Henry II, being the first of the Plantagenet or Angevin kings. A larger dominion was united under his sway than had been held by any previous sovereign of England, for at the time when he became King of England he was already in the possession of Anjou, Normandy, and Aquitaine. Henry II had difficulty in abridging the exorbitant privileges of the clergy. His wishes were formulated in the Constitutions of Clarendon (1164),

which were at first accepted and then repudiated by the Primate Becket. The assassination of Becket, however, placed the king at a disadvantage in the struggle, and after his conquest of Ireland (1171) he submitted to the Church, and did penance at Becket's tomb. Henry was the first who placed the common people of England in a situation which led to their having a share in the government. Richard I, called *Cœur de Lion*, who in 1189 succeeded to his father, Henry II, spent most of his reign away from England, and took a prominent part in the third Crusade. Having undertaken an expedition against France, he received a mortal wound at the siege of Châlons in 1199. John was at once recognized as King of England, and secured possession of Normandy; but Anjou, Maine, and Touraine acknowledged the claim of Arthur, son of Geoffrey, second son of Henry II. On the death of Arthur, while in John's power, these four French provinces were at once lost to England. John's exactions and misgovernment embroiled him with the nobles, and they took measures to secure their own privileges and abridge the prerogatives of the Crown. King and barons met at Runnymede, and on 15th June, 1215, the Great Charter (*Magna Charta*) was signed. In 1216 John died, and his turbulent reign was succeeded by the almost equally turbulent reign of his son, Henry III. The struggle, long maintained in the Great Council (henceforward called Parliament) over money grants and other grievances, reached an acute stage in 1263, when civil war broke out. Simon de Montfort, who had laid the foundations of the House of Commons by summoning representatives of the shire communities to the Parliament of 1258, defeated the king and his son Edward at Lewes in 1264, and in his famous Parliament of 1265 still further widened the privileges of the people by summoning to it burgesses as well as knights of the shire. At the battle of Evesham (1265) Earl Simon was defeated and slain, and the rest of the reign was undisturbed. On the death of Henry III, in 1272, Edward I succeeded without opposition. From 1276 to 1284 he was largely occupied in the conquest and annexation of Wales. In 1292 Baliol, whom Edward had decided to be rightful heir to the Scottish throne, did homage

for the fief to the English king; but when, in 1294, war broke out with France, Scotland also declared war. The Scots were defeated at Dunbar (1296), and the country placed under an English regent; but the revolt under Wallace (1297) was followed by that of Bruce (1306), and the Scots remained unsubdued. The reign of Edward was distinguished by many legal and legislative reforms. In 1295 the first perfect Parliament was summoned, the clergy and barons by special writ, the commons by writ to the sheriffs directing the election of two knights from each shire, two citizens from each city, and two burghers from each borough. Two years later the imposition of taxation without consent of Parliament was forbidden by a special Act. The great aim of Edward, however, to include England, Scotland, and Wales in one kingdom proved a failure, and he died in 1307 marching against Robert Bruce. The reign of his son, Edward II, was unfortunate to himself and to his kingdom. He made a feeble attempt to prosecute the war with Scotland, but the English were almost constantly unfortunate; and at length, at Bannockburn (1314), they were defeated by Robert Bruce. The king was murdered in 1327. The reign of Edward III was as brilliant as that of his father had been the reverse. He claimed the throne of France in 1328 in virtue of his mother, the daughter of King Philip. The victory won by the Black Prince at Crécy (1346), the capture of Calais (1347), and the victory of Poitiers (1356) ultimately led to the Peace of Brétigny in 1360, by which Edward III received all the west of France on condition of renouncing his claim to the French throne. Edward III was succeeded in 1377 by his grandson, Richard II, son of Edward the Black Prince. In 1380 an unjust and oppressive poll-tax brought the grievances of the people to a head, and 100,000 men, under Wat Tyler, marched towards London (1381). Wat Tyler was killed while conferring with the king, and the prudence and courage of Richard appeased the insurgents. In 1399 Richard was deposed, and was succeeded by his cousin Bolingbroke (Henry IV), and soon after murdered. The vigour of Henry's administration quelled every insurrection. The most important—that of the Percies of Northumberland, Owen Glendower, and Douglas of Scotland—was crushed by the battle of

Shrewsbury (1403). Henry died in 1413, leaving his crown to his son, Henry V, who revived the claim of Edward III to the throne of France in 1415, and invaded that country at the head of 30,000 men. The victory of Agincourt was gained in 1415; and after a second campaign a peace was concluded at Troyes in 1420, by which Henry received the hand of Katherine, daughter of Charles VI, was appointed regent of France during the reign of his father-in-law, and declared heir to the throne on his death. Henry died in 1422, however, and his infant son thus became King of England (as Henry VI) and France at the age of nine months. The reign of Henry VI was disastrous. In France (1422–1453) the English forces lost ground, and were finally expelled by Joan of Arc, Calais alone being retained. The rebellion of Jack Cade in 1450 was suppressed, only to be succeeded by more serious trouble. In that year Richard, Duke of York, the father of Edward, afterwards Edward IV, began to advance his pretensions to the throne, which had been so long usurped by the House of Lancaster. The wars which resulted, called the Wars of the Roses, from the fact that a red rose was the badge of the House of Lancaster and a white one that of the House of York, lasted for thirty years, from the first battle of St. Albans, 22nd May, 1455, to the battle of Bosworth, 22nd Aug., 1485. Henry VI was twice driven from the throne (in 1461 and 1471) by Edward of York, whose father had previously been killed in battle in 1460. Edward of York reigned as Edward IV from 1461 till his death in 1483, with a brief interval in 1471; and was succeeded by two other sovereigns of the House of York, first his son, Edward V, who reigned for eleven weeks in 1483; and then by his brother, Richard III, who reigned from 1483 till 1485, when he was defeated and slain on Bosworth field by Henry Tudor, of the House of Lancaster, who then became Henry VII. Henry VII's reign was disturbed by insurrections attending the impostures of Lambert Simnel (1487) and of Perkin Warbeck (1488); but neither of these attained any magnitude. The king's worst fault was avarice. His administration throughout did much to increase the royal power and to establish order and prosperity. He died in 1509. The most important event of the reign

of his son, Henry VIII, was the Reformation. Henry had been espoused to Catherine of Spain, who was first married to his elder brother Arthur, a prince who died young. Henry became disgusted with his queen, and enamoured of one of her maids of honour, Anne Boleyn. He had recourse, therefore, to the Pope to dissolve a marriage which had at first been rendered legal only by a dispensation from the Pontiff; but, failing in his desires, he broke away entirely from the Holy See, and in 1534 got himself recognized by Act of Parliament as the head of the English Church. He died in 1547. He was married six times, and left three children, each of whom reigned in turn. These were: Mary, by his first wife, Catherine of Aragon; Elizabeth, by his second wife, Anne Boleyn; and Edward, by his third wife, Jane Seymour. Edward, who reigned first, with the title of Edward VI, was nine years of age at the time of his succession, and died in 1553, when he was only sixteen. Mary, who succeeded him, was a bigoted Catholic, and seems to have wished for the crown only for the purpose of re-establishing the Roman Catholic faith. She died in 1558. Elizabeth, who succeeded her sister Mary, was attached to the Protestant faith, and found little difficulty in re-establishing it in England. As the most powerful Protestant nation, and as a rival to Spain in the New World, it was natural that England should become involved in difficulties with that country. The dispersion of the Armada by the English fleet under Howard, Drake, and Hawkins (1588) was the most brilliant event of a struggle which abounded in minor feats of valour. In Elizabeth's reign London became the centre of the world's trade. To Elizabeth succeeded (in 1603) James VI of Scotland and I of England, son of Mary Queen of Scots and Darnley. His accession to the crown of England in addition to that of Scotland did much to unite the two nations. His absurd insistence on his divine right made his reign a continuous struggle between the prerogative of the Crown and the freedom of the people. The nation at large, however, continued to prosper through the whole of his reign. His son, Charles I, who succeeded him in 1625, inherited the same exalted ideas of royal prerogative, and his marriage with a Catholic, his arbitrary rule, and illegal

methods of raising money provoked bitter hostility. Under the guidance of Laud and Strafford things went from bad to worse. Civil war broke out in 1642 between the king's party and that of the Parliament, and the latter proving victorious, in 1649 the king was beheaded. A Commonwealth or republican government was now established, in which the most prominent figure was Oliver Cromwell, who, in a series of masterly movements, subjugated Ireland and gained the important victories of Dunbar and Worcester. In April, 1653, Cromwell forcibly ejected the members of Parliament and put the keys of the House in his pocket. A Parliament—the Little or Barebones Parliament—was summoned, and in the December of the same year Cromwell was installed Lord Protector of the Commonwealth of England, Scotland, and Ireland. With more than the power of a king, he succeeded in dominating the confusion at home, and made the country feared throughout the whole of Europe. Cromwell died in 1658, and the brief and feeble protectorate of his son Richard followed. Charles II, son of Charles I, was called to the throne by the Restoration of 1660. The promises of religious freedom made by him before the Restoration in the Declaration of Breda were broken by the Test and Corporation Acts, and by the Act of Uniformity, which drove two thousand clergymen from the Church and created the great dissenting movement of modern times. The Conventicle and Five-mile Acts followed, and the 'Drunken Parliament' restored Episcopacy in Scotland. As Charles II left no legitimate issue, his brother, the Duke of York, succeeded him as James II (1685–1688). An invasion by an illegitimate son of Charles, the Duke of Monmouth, who claimed the throne, was suppressed, and the king's arbitrary rule was supported by the wholesale butcheries of such instruments as Kirke and Jeffreys. The whole nation was prepared to welcome any deliverance, and in 1688 William of Orange, husband of James's daughter Mary, landed in Torbay. James fled to France, and a convention summoned by William settled the crown upon him, he thus becoming William III. Annexed to this settlement was a Declaration of Rights circumscribing the royal prerogative by depriving him of the right to exercise dispensing power, or to exact

money, or maintain an army without the assent of Parliament. This placed henceforward the right of the British sovereign to the throne upon a purely statutory basis. A Bill for triennial Parliaments was passed in 1694, the year in which Queen Mary died. William died in 1702, and by the Act of Settlement Anne succeeded him. The new queen's rule opened with the brilliant successes of Marlborough at Blenheim (1704) and Ramilies (1706). In 1707 the history of England becomes the history of Britain, the Act of Union passed in that year binding the Parliaments and Realms of England and Scotland into a single and more powerful whole. See *Britain*.

Ecclesiastical History.—The first religion of the Celts of England was Druidism. It has been conjectured that Christianity may have reached Britain by way of France (Gaul) before the conclusion of the first, or not long after the commencement of the second century, but the period and manner of its introduction are uncertain. A period of almost total eclipse followed the inroad of the pagan Saxons, and it was not till A.D. 570 that signs of change showed themselves in the new nationality. On the coming of Austin, or St. Augustine, sent over in 596 by Gregory the Great, Ethelberht, King of Kent, and most of his subjects, adopted Christianity. The Northumbrians were next converted, an event accelerated by the labours of the missionary Paulinus. The conversion of the other kingdoms followed in the course of the seventh century. At a grand council held at Hertford, A.D. 673, uniformity was secured among all the English Churches, and the see of Canterbury made supreme. Under Anselm (1093-1109) the Church was practically emancipated from the control of the State, and the power of the Pope became supreme. The result was a considerable increase of monasticism in England, and the prevalence of the greatest abuses under the cloak of Church privilege. The reaction set in during the reign of Henry III, when the vigorous independence of Robert Grosseteste did much to stimulate the individual life of the English Church. In the fourteenth century the teaching of Wycliffe promised to produce a thorough revolt from Rome; but the Wars of the Roses prevented matters coming to a head. A steady decay of

vital power set in, however, and when Henry VIII resolved to recast the English Church there was no effective protest. In 1534 the Papal authority was set aside by Act of Parliament, and by another Act of Parliament, passed in 1535, Henry assumed the title of Supreme Head of the Church of England. These Acts, although they severed the connexion between the English Church and Rome, did not alter the religious faith of the Church. But under Edward VI, in 1551, a new confession of faith was embodied in forty-two articles, denying the infallibility of councils, keeping only two sacraments, baptism and the Lord's Supper, and rejecting the real presence, the invocation of saints, prayer for the dead, purgatory, and the celibacy of the clergy. At the same time a new liturgy was composed, in which English was substituted for Latin. With the reign of Mary the old religion was re-established; and it was not till that of Elizabeth that the Church of England was finally instituted in its present form. The doctrines of the Church were again modified, and the Forty-two Articles were reduced to thirty-nine by the convocation of the clergy in 1563. As no change was made in the episcopal form of government, and some rites and ceremonies were retained which many of the reformed considered as superstitious, this circumstance gave rise to many future dissensions. From James I some relief was anticipated by Puritans and Nonconformists, but they were disappointed. Under Charles I the attempt was made, through the instrumentality of Laud, to place all the Churches of Great Britain under the jurisdiction of bishops. But after the death of Laud the Parliament abolished the episcopal government, and condemned everything contrary to the doctrine, worship, and discipline of the Church of Geneva. As soon as Charles II was restored, the ancient forms of ecclesiastical government and public worship were re-established, and three severe measures were passed against nonconformity, namely, the Corporation Act of 1661, the Act of Uniformity, passed in 1662, and the Test Act, passed in 1673. These Acts were repealed in 1828. The Established Church of England has always adhered to Episcopacy. Under the sovereign as supreme head, the Church is governed by three archbishops and forty-one bishops. The Archbishop of Canterbury

is styled the *Primate of all England*. The province of Canterbury comprehends 25 bishoprics; in the province of the Archbishop of York, who is styled *Primate of England*, there are 11 bishoprics, the province comprising Cheshire, Lancashire, Yorkshire, and the other northern counties. Wales has now been formed into a separate archbishopric. An Act was passed in 1914 disestablishing and disendowing the Church in Wales and Monmouthshire. The Act, suspended during the European War, came into force on 31st March, 1920. The doctrines of the Church are contained in the Thirty-nine Articles; the form of worship is directed by the *Book of Common Prayer*. (See *Common Prayer*.) Endowments yield a revenue of over £6,000,000 annually. The clergy number about 27,000.

English Art.—In architecture, the chief styles which have prevailed are: *Early English* (1190–1270), *Decorated* (1270–1377), *Perpendicular* (1377–1547), *Elizabethan* and *Jacobean*, and *Queen Anne*. In painting, there are few native artists of importance prior to William Hogarth (1697–1764). Throughout the eighteenth century English artists attained higher eminence in portrait painting than in other departments, and it culminated in Sir Joshua Reynolds (1723–1792), Thomas Gainsborough (1727–1788), and Romney (1734–1802). These were followed by Raeburn (1756–1823) and Lawrence (1769–1830). Barry (1741–1806), West (1738–1820), and Copley (1737–1815) gained distinction in historical compositions, especially in pictures of battles. Landscape painting was represented by Richard Wilson (1714–1782) and by Gainsborough. Sir David Wilkie (1785–1841), in what is known abroad as genre painting, gained a European reputation that is unsurpassed. In the same class of art C. R. Leslie (1794–1859), Newton (1795–1835), Collins (1788–1847), and Mulready (1786–1863) gained great distinction. In landscape the reputation of Turner (1775–1857) stands alone. Other distinguished landscape painters are Clarkson Stanfield (1798–1867), David Roberts (1796–1864), Wm. Müller (1812–1845), John Constable (1776–1837), and Calcott (1799–1844). In historical painting Hilton (1786–1839), Eastlake (1793–1865), Eddy (1787–1849), E. M. Ward (1816–1879), C. W. Cope (1811–1890), and D. Maclise (1811–1870) attained celebrity. Landseer (1802–1873) stands by himself

as a painter of animals. Prominent among more recent painters are: In historical painting, Leighton, Alma-Tadema, Watts, Poynter, Long, Goodall, Holman Hunt, Noel Paton, Burne-Jones, and Madox Brown, as also W. P. Frith. In figure painting or genre, T. Faed, Erskine Nicol, Fildes, Orchardson, Herkomer, Millais, and Pettie. In portraiture, Millais, Frank Holl, Oulless, and Richmond. In landscape, Linnell, Hook, W. J. Müller, Peter Graham, John Brett, Vicat Cole, H. Moore, Keeley Halswelle. In water-colours the most eminent artists have been Girtin (1773–1802), Cotman (1782–1842), Liverseege (1803–1832), Stothard (1755–1834), Turner, David Cox (1788–1859), De Wint (1784–1849), Copley Fielding (1787–1855), Samuel Prout (1783–1852), W. H. Hunt (1790–1864), Louis Haghe (1806–1885), W. L. Leitch (1804–1883), Sam Bough (1822–1878), and John Gilbert (1817–1897). English sculpture was long merely an accessory to architecture, and few English sculptors are known by name till comparatively modern times. After the Restoration two sculptors of some note appeared, Grinling Gibbons, a wood-carver, and Caius Gabriel Cibber. During the eighteenth century there was no English sculptor of great eminence till John Flaxman (1755–1826). He had for rival and successor Sir Francis Chantrey (1781–1841), who acquired renown by the busts and statues which he made of many of the eminent men of his time. John Carew, Sir Richard Westmacott (1775–1856), E. H. Baily (1788–1867), John Gibson (1790–1866), P. MacDowell (1799–1870), H. Weekes (1807–1877), J. H. Foley (1818–1874), J. Edgar Boehm (1834–1890), and Thomas Woolner (1825–1892) are a few of the eminent sculptors of the nineteenth century. W. H. Thornycroft, E. Onslow Ford, C. B. Birch, Alfred Gilbert, G. F. Watts, Henry H. Armstead, G. Simons, Sir Thomas Brock, Harry Bates, and Sir George Frampton are among the foremost sculptors of more recent times.

English Language.—The language spoken in England from the settlement of the Anglo-Saxons to the Norman Conquest (say 500–1066) is popularly known as Anglo-Saxon, though simply the earliest form of English (see *Anglo-Saxons*). It was a highly inflected and purely Teutonic tongue presenting several dialects. The Conquest introduced the Norman-French, and from 1066 to about 1250 two languages

were spoken, the native English speaking their own language, the intruders speaking French. During this period the grammatical structure of the native language was greatly broken up, inflexions fell away, or were assimilated to each other; and towards the end of the period we find a few words written in a language resembling the English of our own day in grammar, but differing from it by being purely Saxon or Teutonic in vocabulary. Finally, the two languages began to mingle, and form one intelligible to the whole population, Normans as well as English, this change being marked by a great infusion of Norman-French words, and English proper being the result. If we divide the history of the English language into periods, we shall find three most distinctly marked: first, the Old English or Anglo-Saxon, extending down to about 1100; second, the Middle English, 1100-1400 (to this period belong Chaucer, Wycliffe, Langland); third, Modern English. A more detailed subdivision would give transition periods connecting the main ones. The chief change which the language has experienced during the modern period consists in its absorbing new words from all quarters in obedience to the requirements of advancing science, more complicated social relations, and increased subtlety of thought. At the present time the rapid growth of the sciences already existing, and the creation of new ones, have caused whole groups of words to be introduced, chiefly from the Greek, though unfortunately not a few are hybrid words, coined by some scientist who had small Latin and less Greek.

English Literature.—For Anglo-Saxon literature, see the article *Anglo-Saxons*. Apart from a few brief fragments, the first English writings after the Conquest are the *Brut* of Layamon (about 1200) and the *Ormulum*, a collection of metrical homilies attributed to Orm, an Augustine monk. Next in importance come the rhyming chroniclers Robert of Gloucester (time of Henry III, Edward I) and Robert of Brunne or Mannyng (died 1340), other writers being Dan Michel of Northgate (*Ayenbite of Inweyt*, 1340), Richard Rolle of Hampole (*Pricke of Conscience*, 1340), Laurence Minot (died 1352), and several works of uncertain authorship, including the *Ancren Riwle* (? Richard Poor, died 1237), *The Owl and the Nightin-*

gale (? Nicholas of Guildford), *The Land of Cockayne* (? Michael of Kildare), the song against the King of Almaine, and a dialogue between the Body and the Soul. To this pre-Chaucerian period belong also several English translations of French romances—*Horn*, *Tristrem*, *Alisaunder*, *Havelok*, and others. A rapid expansion of the literature followed the development of the language in the fourteenth century, having as the foremost figure that of Chaucer (c. 1340-1400), who, writing at first under French influences, and then under Italian, became in the end the most representative English writer of the time. Contemporary with him was the satirist William Langland or Langley (1332-1400), the indefatigable John Gower (1325-1408), and the Scot John Barbour (1316-1395). In prose the name of John Wycliffe (1324-1384) is pre-eminent. The period from the time of Chaucer to the appearance of Spenser, that is, from the end of the fourteenth to near the end of the sixteenth century, is a very barren one in English literature. The immediate successors of Chaucer, Occleve (1370-1454) and Lydgate (died 1460), were not men of genius, and the centre of poetic creation was for the time transferred to Scotland, where James I (1394-1437) headed the list which comprises Andrew de Wyntoun (fifteenth century), Henry the Minstrel or Blind Harry (died after 1492), Robert Henryson (died before 1508), William Dunbar (1460-1520), Gavin Douglas (1474-1522), and Sir David Lyndsay (1490-1557). In England the literature was chiefly polemical, the only noteworthy prose prior to that of More being that of Reginald Pecock (1390-1460), Sir John Fortescue (1395-1485), and Malory's *Morte d'Arthur* (completed 1469); the only noteworthy verse, that of John Skelton (1460-1529).

It was now that several events of European importance combined to stimulate life and enlarge the mental horizon—the invention of printing, or rather of movable types, the promulgation of the Copernican system of astronomy, the discovery of America, the Renaissance, and the Reformation. The Renaissance spread from Florence to England by means of such men as Colet, Linacre, Erasmus, and Sir Thomas More (1480-1535). Important contributions to the prose of the time were the Tyndale *New Testament*, printed in 1525, and the Coverdale *Bible* (1535).

The first signs of an artistic advance in poetic literature are to be found in Wyatt (1503-1542) and Surrey (1516-1547), who naturalized the sonnet. The drama, too, had by this time reached a fairly high stage of development (see *Drama*). To Nicholas Udall (1504-1556) the first genuine comedy, *Ralph Roister Doister*, was due, this being shortly afterwards followed by (?) John Still's *Gammer Gurton's Needle* (1566). The first tragedy, the *Ferrex and Porrex*, or *Gorboduc* of Sackville (died 1608) and Norton (died 1600), was performed in 1561, and the first prose play, the *Supposes* of Gascoigne (died 1577) in 1566. The figures which bulk most largely, however, are those of Sidney (1554-1586) and Spenser (1552-1599). In drama Lyly, Peele, Greene, Nash, and Marlowe (1564-1593) are the chief immediate precursors of Shakespeare (1564-1616), Marlowe alone, however, being at all comparable with the great master. Contemporary and later dramatic writers were Ben Jonson (1573-1637), the second great Elizabethan dramatist, Middleton (died 1627), Marston, Chapman (1557-1634), Thomas Heywood, Dekker (died 1639), Webster (seventeenth century), Ford (1586-1639), Beaumont (1586-1616) and Fletcher (1576-1625), and Massinger (1584-1640). The minor poets include Michael Drayton (1563-1631), Samuel Daniel (1562-1619), John Davies (1570-1626), John Donne (1573-1631), Giles Fletcher (1580-1623), and Phineas Fletcher (1584-1650), and Drummond of Hawthornden (1585-1649). In Elizabethan prose the prominent names are those of Roger Ascham (1515-1568), John Lyly (1553-1606), Hooker (1554-1600), Raleigh (1552-1618), Bacon (1561-1626), the founder in some regards of modern scientific method, Burton (1576-1640), Herbert of Cherbury (1581-1648), and Selden (1584-1654), with Overbury, Holinshed, Stowe, Camden, Florio, and North. The issue of the Authorized Version of the Bible in 1611 may be said to close the prose list of the period, as it represents the finest flower of English prose.

After the death of James I the course of literature breaks up into three stages, the first from 1625 to 1640, in which the survivals from the Elizabethan Age slowly die away. The 'metaphysical poets', Cowley, Wither, Herbert, Crashaw, and Quarles, and the cavalier poets, Suckling, Carew,

Denham, all published poems before the close of this period, in which also Milton's early poems were composed, and *Comus* and *Lycidas* published. The second stage (1640-1660) was almost wholly given up to controversial prose. In this Milton was easily chief. With the Restoration a third stage was begun. Milton turned his new leisure to the composition of his great poems; the drama was revived, and Davenant and Dryden, with Otway, Southerne, Etherege, Wycherley, Congreve, Vanbrugh, and Farquhar in their first plays, and minor playwrights, are the most representative writers of the period. Butler established a genre in satire, and Marvell as a satirist in some respects anticipated Swift; Roscommon, Rochester, and Dorset contributed to the little poetry; while in prose we have Hobbes, Clarendon, Fuller, Sir Thomas Browne, Walton, Cotton, Pepys and Evelyn, John Bunyan, Locke, Sir William Temple, Owen Feltham, Sir Henry Wotton, James Harrington, and a crowd of theological writers, of whom the best known are Jeremy Taylor, Richard Baxter, Robert Barclay, William Penn, George Fox, Isaac Barrow, John Tillotson, Stillingfleet, Bishop Pearson, Sherlock, South, Sprat, Cudworth, and Burnet. Other features of the last part of the seventeenth century were the immense advance in physical science under Boyle, Isaac Newton, Harvey, and others, and the rise of the newspaper press.

Dryden's death in 1700 marks the commencement of the so-called Augustan Age in English literature. During it, however, no greater poet appeared than Pope (1688-1744). Signs of reaction against the Augustan Age are apparent in the verse of Thomson (1700-1748), Gray (1716-1771), Collins (1720-1759), Goldsmith (1728-1774), and in the productions of Macpherson and Chatterton. The poets Prior (1664-1721), Gay (1688-1732), and Ambrose Phillips (1671-1749) inherit from the later seventeenth century; and there are many minor poets—Garth, Parnell, Dyer, Shenstone, Blair, Akenside, Falconer, Anstey, Beattie, Allan Ramsay, and Robert Fergusson. It is in prose that the chief development of the eighteenth century is to be found. Defoe (1661-1731) and Swift (1667-1745) led the way in fiction and prose satire; Steele (1672-1729) and Addison (1672-1719),

working on a suggestion of Defoe, established the periodical essay; Richardson (1689-1761), Fielding (1707-1754), Smollett (1721-1771), and Sterne (1713-1768) raised the novel to sudden perfection. Goldsmith also falls into the fictional group as well as into that of the poets and of the essayists. Johnson (1709-1784) exercised during the latter part of his life the power of a literary dictator, with Boswell (1740-1795) as his 'Secretary of State'. The other chief prose writers were Bishop Berkeley (1685-1753), Arbuthnot (1675-1735), Shaftesbury (1671-1713), Bolingbroke (1678-1751), Burke; the historians David Hume (1711-1776), William Robertson (1721-1793), Edward Gibbon (1737-1794); the political writers Wilkes and 'Junius'; the economist and moral philosopher Adam Smith (1723-1790); the philosophical writers Hume, Bentham (1749-1832), and Dugald Stewart (1753-1828); the scholars Bentley (1662-1742), Sir William Jones (1746-1794), and Richard Porson (1759-1808); the theologians Atterbury, Butler (1692-1752), Warburton, and Paley; and some playwrights, of whom the most important was Sheridan, but who also included Rowe, John Home, Colley Cibber, Colman the elder, and Foote.

With the French Revolution, or a few years earlier, the modern movement in literature may be said to have commenced. The departure from the old traditions, traceable in Gray and Collins, was more clearly exhibited in the last years of the century in Cowper (1731-1800) and Burns (1759-1796), and was developed by Blake (1757-1828), Bowles (1762-1850), and the 'Lake poets' Wordsworth (1770-1850), Coleridge (1772-1834), and Southey (1774-1843). Amongst the earlier poets of the nineteenth century, also, were George Crabbe (1754-1832), Sir Walter Scott (1771-1832), Hogg (1772-1835), Campbell (1777-1844), James Montgomery, Mrs. Hemans, Bryan Waller Procter ('Barry Cornwall'), Joanna Baillie, and Robert Montgomery. A more important group was that of Byron (1788-1824), Shelley (1792-1822), and Keats (1796-1821), with which may be associated the names of Leigh Hunt (1784-1859), Thomas Moore (1779-1852), and Landor (1775-1864). Among the earlier writers of fiction there were several women of note, such as Maria Edgeworth (1767-1849) and Jane

Austen (1775-1817). The greatest name in fiction is unquestionably that of Scott. Other prose writers were Malthus, Hallam, James Mill, Southey, Hannah More, Cobbett, William Hazlitt, Sydney Smith, Francis Jeffrey, and Lord Brougham. In the literature since 1830 poetry has included as its chief names those of Praed, Hood, Sidney Dobell, Gerald Massey, Charles Mackay, Philip James Bailey, William Allingham, Elizabeth Barrett Browning, Coventry Patmore, the second Lord Lytton ('Owen Meredith'), Arthur Hugh Clough, Matthew Arnold, Dante G. Rossetti, Robert Buchanan, Wm. Morris, Sir Lewis Morris, Jean Ingelow, Swinburne, and last and greatest, Tennyson and Browning. Among more modern English poets are Stephen Phillips (1868-1915), Francis Thompson (1860-1907), Sir William Watson (born 1853), John Davidson (1857-1909), and R. Kipling (born 1865). A brilliant list of nineteenth-century novelists includes Marryat, Michael Scott, the first Lord Lytton, Ainsworth, Benjamin Disraeli (Earl of Beaconsfield), Dickens, Thackeray, Charles Kingsley, Charlotte Brontë, Lover, Lever, Wilkie Collins, Mayne Reid, Charles Reade, George Eliot, Anthony Trollope, William Black, Thomas Hardy, R. D. Blackmore, George Meredith, R. L. Stevenson, Miss Braddon, Mrs. Craik (Miss Mulock), Mrs. Oliphant, Miss Yonge, and others. Towards the end of the nineteenth and at the beginning of the twentieth century there was a deepening interest in the drama, and the list of brilliant dramatists includes the names of Wilde, Barrie, H. A. Jones, G. B. Shaw, Pinero, Granville Barker, and others. Foremost among twentieth-century novelists are John Galsworthy, Joseph Conrad, and H. G. Wells. To the historical and biographical list of the nineteenth century belong Macaulay, Buckle, Carlyle, Thirlwall, Grote, Milman, Froude, Lecky, S. R. Gardiner, Kinglake, John Richard Green, E. A. Freeman, Stubbs, Dean Stanley, John Morley, and Leslie Stephen. In science and philosophy among the chief writers of the nineteenth century have been Whewell, Sir W. Hamilton, Mansel, John Stuart Mill, Alexander Bain, Hugh Miller, Michael Faraday, Charles Darwin, Huxley, Tyndall, Max Müller, Herbert Spencer, T. H. Green, F. H. Bradley, Clerk Maxwell, Lord Kelvin (William Thomson), P. G. Tait, Sir G. G.

Stokes, and Lord Rayleigh. Separate articles will be found on the more important writers. — BIBLIOGRAPHY: *Cambridge History of English Literature*; G. Saintsbury, *Short History of English Literature*.

English Channel, the arm of the sea which separates England from France, extending, on the English side, from Dover to Land's End; and on the French, from

Calais to the Island of Ushant. On the east it communicates with the North Sea by the Straits of Dover, 21 miles wide. The pilchard and mackerel fisheries are very important. A proposal to construct a tunnel between Dover and Calais has been much discussed, but whether operations will ever commence is a matter of great uncertainty.



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